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United States Naval Institute Proceedings

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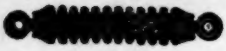

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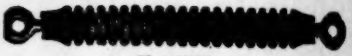

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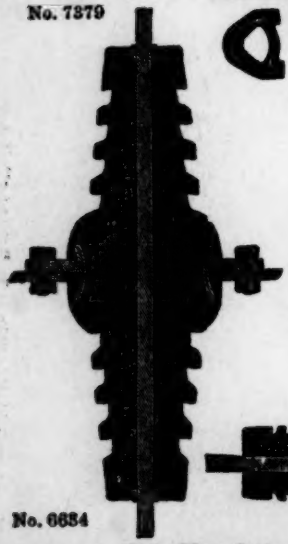

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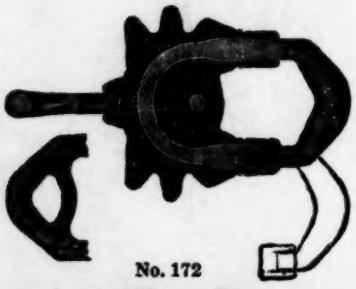

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THE DOCTRINES OF ULTIMATE CONSUMPTION AND SUBSTITUTION

THEIR DEVELOPMENT FROM THE DOCTRINE OF THE CONTINUOUS VOYAGE

By COMMANDER RAYMOND STONE, U. S. Navy (Retired)

During the early part of the last century or, to be more definite, in the year 1805, Sir William Scott, afterwards Lord Stowell, enunciated for perhaps the first time in definite expression of terms the principle of maritime international law known from that time to the present as the "Doctrine of the Continuous Voyage." This judicial pronouncement was made either in the course of or at the conclusion of the British prize court proceedings in the celebrated case of the *Maria,* Lord Stowell's reported statement being in these words:

> It is an inherent and settled principle in cases in which the same question can have come under discussion, that the mere touching at any port without importing the cargo into the common stock of the country, will not alter the nature of the voyage, which continues the same in all respects, and must be considered as a voyage to the country to which the vessel is actually going for the purpose of delivering the cargo at the ultimate port.

This doctrine, or principle, was thus early introduced by prize courts, and incorporated into the accepted body of rules governing British, and later American, prize court proceedings. But, as has been remarked by Phillipson in his latest (1916) edition of Wheaton, "In Lord Stowell's time, and down to the American Civil War, this doctrine had only been applied to cases covered

by the Rule of 1756 (which prohibited neutrals from engaging in a belligerent's coasting or colonial trade closed to them in time of peace), or where an underhand trade was attempted to be carried on by subjects of one belligerent with the enemy."

In the course of the Civil War the doctrine, in its meaning and scope, was rapidly developed, widely extended, frequently invoked and vigorously applied by the prize courts of the United States. Blockade running and contraband carriage were brought within its terms at this period by rulings of the Supreme Court on prize court appeals, and thus was introduced, sanctioned and confirmed an innovation in the hitherto accepted law of prize in maritime warfare.

The introduction into the same court decision, or into decisions more or less closely related by analogy, of these two elements, breach of blockade and carriage of contraband, which are separate and distinct in principle though often closely related in performance, has caused at times no little confusion of thought and expression in the treatment of the doctrine by writers and students, though the doctrine itself is fairly clearly perceived and understood.

The final landing place of cargo being an essential feature in all cases coming up for court review under the rule, the doctrine soon came to be more fully stated as "the doctrine of continuous voyage to ultimate destination." The famous cases of the *Bermuda* and the *Springbok* are illustrative of this point. However, during the American Civil War, the United States prize courts, in decisions relating to breach of blockade (as distinct from contraband carriage) applied the principle only to cases in which the ultimate destination, being belligerent, was reachable *by sea*. If the port of discharge from the sea carrier were neutral and the final stage of the journey were by land transportation from the neutral port to an enemy destination, the rule was held to be inapplicable as far as the violation of blockade is concerned. But, by a process of reasoning that appears to be not altogether clear and logical, it was held to be applicable in the case of contraband cargo.

During and for some years subsequent to the Civil War these rules, or rather these applications of the main rule, appear to have been regarded, at least in Great Britain, whose prize court rules and decisions are in many respects identical with those of our own courts, as merely the expression of United States law;

although the refusal of the British Government to enter any diplomatic protest or objection to the decisions of the United States prize courts in the *Springbok* and *Peterhoff* cases would seem to indicate acquiescence in the soundness of the decisions even if not full acceptance of the rules upon which thy rested. And, to quote again from Phillipson, ". . . . the action of Lord Salisbury with regard to the seizure of the *Bundesrath* and the *Herzog* and the *General* during the Anglo-Boer war (1900) was an indication that so far as contraband is concerned the British Government was inclined to accept the principles followed by the courts of the United States."

From its first pronouncement, throughout a full century, and until very recent times, the doctrine of the continuous voyage to ultimate destination concerned itself principally if not exclusively with goods and the delivery of goods intended solely for the use of the armed forces or administrative departments of the belligerent government or peculiarly adaptable for such use. Articles intended or suitable primarily for the needs and use of the civil population were apparently excluded from the application of the rule.

Changed and swiftly changing conditions obtaining during the World War now in progress, improved facilities for the carriage of goods by sea and by land, the close proximity to one another of belligerents and neighboring neutrals with interlocking transportation systems by rail and inland waterways; and, perhaps more important than these, the fact, at first denied and combated during the early stages of the war, then reluctantly entertained, and now fully realized, recognized and affirmed, that war is no longer merely a trial at arms between the military and naval forces of the contending belligerents, but in the truest and completest sense a conflict between the whole people and the entire resources of each belligerent state and those of the enemy state—all of these things have rendered inevitable and irresistible the advent and rapid growth of the doctrine of "ultimate consumption."

In its simplest expression this doctrine means to say this: that no matter what may be the origin and the nominal or even the ultimate destination of goods comprising cargoes in whole or in part, if such goods are to become available for eventual use by a belligerent, either his armed field forces or his unarmed home

forces (manufacturing, industrial, agricultural), the opposing belligerent is constrained, for his own sake and protection and for the preservation of his war fortunes, to prevent by all means practical and not fundamentally illegal the delivery of these goods at a place whence they become accessible for such eventual use, which is, in other words, "ultimate consumption by the enemy."

Now, inasmuch as in this war the distinction between absolute contraband and conditional contraband has been in practice if not by proclamation wiped out, the doctrine of ultimate consumption has come to be applied to all classes, sorts and kinds of goods which may, by front, side or back door, overland, oversea, or undersea, enter into enemy territory or possession and become available for the support and sustentation of the enemy people, civil as well as military. This application is an entirely natural outcome of the altered conditions which have exerted ruling force in world affairs during the last four years. While it may not have been long foreseen, nevertheless its appearance seems to have created little or no surprise, its adoption to have met with opposition which though not altogether feeble has proved under the controlling circumstances of the war to be futile.

And so, by process of very simple reasoning, by an extension of argument so gentle and unaggressive as to make its advance almost unnoticeable, we proceed yet one more step in the development of the fundamental principle of the continuous voyage theory and reach the "doctrine of substitution."

This doctrine is immediately consequent upon the adoption of the doctrine of ultimate consumption.

It concerns neutral recipient countries principally if not exclusively.

In the modern view, one of the most obvious and compelling duties of a belligerent towards himself is that of preventing as far as possible supplies of any and all kinds from reaching his enemy, from whatever source they may emanate and by whatever conveyance and route they may travel. Distinctions based upon contraband character have in large measure fallen into a state of "innocuous desuetude." All supplies, it may be said, are used either directly or indirectly in the prosecution of war. While it is undeniably true that a belligerent may not, by the mere laying down of a rule or the stroke of a pen in signing a decree, forbid neutrals to furnish supplies to his enemy, it is equally true that

he may in practice, if he possesses the power, so order and regulate the procurement and receipt of supplies by such neutrals that the latter will have little or none over and above their own needs to spare for exportation to any other country, neutral or belligerent.

In the course of this war, certain of the European neutrals, recipients of supplies from belligerent sources, expressed a willingness to agree with the furnishing belligerents not to permit the re-export of such supplies, principally foodstuffs, as they might thus acquire. Agreements along these lines were concluded and entered into. Before long, however, it was discovered by the interested belligerents that although the neutral parties to the agreements were observing their terms to the letter, the results anticipated by the belligerent parties to the agreements were not forthcoming. A little investigation proved this disappointing condition to be due to the fact that while every pound of foodstuffs imported into the neutral country was consumed or remained in stock there it released an equivalent pound of food, locally produced, for exportation to the very enemy countries which the belligerents had sought to cut off by means of the agreements involved. This disclosure demonstrated in a most positive manner the very easy method open to an enterprising neutral whereby he might observe the literal terms of an agreement and yet nullify the effect intended and expected by the other party to the same agreement. Realization of this fact gave rise to the conception, formulation and pronouncement of the principle which I have ventured to embody in the expression, "the doctrine of substitution." Application of this doctrine permits a neutral to receive from a belligerent food and other supplies in amount only such that when they are added to domestic production the actual needs of the neutral will be met; and it forbids, under penalty of cutting off supplies, export to the opposing belligerent of any article for which the imported article is a substitute.

The most recent expression of the idea contained in this doctrine may be found in the last subparagraph of paragraph 1, Article II, of the "General Agreement Between War Trade Board and Norway Relating to U. S. Exports to That Country," which reads as follows:

> No article imported into Norway under the provisions hereof shall be exported by Norway to other than "allied" destination, *nor shall any*

article released by such importation be exported to other than "allied" destination.—See *Official Bulletin*, Monday, May 27, 1918.

Thus there appears in the very latest official pronouncement of an administrative agency of our government the substantial expression of the principle which I have herein termed "the doctrine of substitution" and which, it seems safe to predict, has come to stay.

Just as this article was going to press a special cable report from London, dated June 17, transmitted a despatch under the heading, "Swedes Sign Pact; Allies Gain Ships. Food and Materials to be Supplied Under New Agreement." The concluding paragraph of the despatch reads:

> The Allies on their part undertake to facilitate the importation into Sweden of stipulated quantities of foodstuffs and commodities required by Sweden's trade and industries, *subject to control and guarantees against re-export either of imported articles themselves or any of their products or articles of similar character.* (The italics are mine.)

Is not this indicative of the signs of the times?

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OUR HERITAGE FROM PAUL JONES

By Lieutenant Holloway H. Frost, U. S. Navy

I. Introduction

History plays queer tricks! How many heroes has it forgotten? How many details of no importance has it magnified so they are known by every schoolboy? It has recently become the fashion to quote Napoleon to the effect that God is on the side of the heaviest battalions, when Frederick was really the originator of this statement, but in a little different form so as to make it mean exactly the opposite. How many of us have thrilled with pride at that thoroughly American saying, "Wait until you can see the whites of their eyes," only to learn that it was used at the battle of Mollwitz many years before. How many of us have admired that picture of the Old Guard at Waterloo, with rugged old Cambronne shouting, "The Guard dies but it does not surrender," a statement that later became a standing joke in the French Army, Cambronne really having said something far less theatrical and more effective. While we pride ourselves greatly upon knowing these little details the greatest hero of all, old Vice Admiral Regnier Klasszoon, lies buried in the old Dutch histories and even Jacob van Heemskerk, the victor of the great battle off Gibraltar, is practically unknown.

But one of the strangest tricks of all has been played on the founder of our own navy, Paul Jones. To the British, Paul Jones is still "the pirate Paul Jones, a rebellious subject and state criminal," with the exception of the statesman Disraeli and the generous Thursfield. To Americans he is still little more than an adventurous seaman who "hasn't yet begun to fight" and when he does begin can fight "with extraordinary and unheard-of desperate stubbornness."

But Jones was something more of a man than this! As early as 1775, Washington wrote to the Chairman of the Naval Com-

mittee in Congress: "Mr. Jones is certainly not only a master-mariner within the scope of the art of navigation, but he also holds a strong and profound sense of the military weight of command on the sea. His powers of usefulness are great and must be constantly kept in view."

While at Brest before the sailing of the *Ranger* he attended a luncheon at which were present the commander-in-chief of the French fleet and numerous other officers of high rank. "In some way the subject of the battle off Malaga was brought up at this luncheon. Jones, whose studies of naval history fully equipped him for the discussion, made bold to traverse a criticism by D'Orvilliers on the failure of Toulouse to follow the Anglo-Dutch fleets under Sir George Rooke when they retreated toward Gibraltar. In this debate, Jones, who took the side of Toulouse, displayed knowledge of the strategy and tactics of that great combat which challenged the admiration of D'Orvilliers himself, as well as that of all the other French officers present. In the course of his review of the event, he showed that he knew to a ship, to a gun, and almost to a man, the strengths of the respective fleets. He also exhibited comprehensive knowledge of the grand strategy of the campaign as a whole, and an accurate understanding of the political bearing of the operations upon the dynastic questions involved in the war of the Spanish Succession. This amazed D'Orvilliers, who had previously regarded him with a sort of patronizing interest as a Yankee skipper of something more than the usual dash and cleverness."

Napoleon said: "Our admirals are always talking about pelagic conditions and ulterior objects, as if there were any condition or object in war except to get in contact with the enemy and destroy him." That was Paul Jones' view of the conditions and objects of naval warfare. It was also Nelson's.

You know perhaps what Von der Goltz said about military writers: "Whoever writes on strategy and tactics ought not in his theories to neglect the point of view of his own people; he should give us a national strategy, a national tactics. Only thus will he render a real service to his country." If we are to have a national strategy and a national tactics should we not consult the principles of our own naval leaders in the past and especially of that captain who has been very justly recognized as the founder

of the United States Navy? These principles were given extraordinary weight by the greatest leaders of his time. They are laid down, as Thursfield says, with "extraordinary penetration, sagacity, and breadth of view." They are stated in precise and beautiful language; and what is more Paul Jones was not a captain who only deduced principles; he applied them in what was to say the least a most startling manner and illustrated every one of them by his own brilliant conduct. He has left us a priceless heritage! Is it not time we made use of it?

It will be my object to place his principles before you in his own words, to show you how the more important coincided with those laid down by the other great captains, especially Nelson and Napoleon, both of whom he strikingly resembled, and to make clear how he, as far as opportunity was given him, illustrated them in his own too brief career.

II. GENERAL QUALIFICATIONS FOR A NAVAL OFFICER

1. "As this is to be the foundation—or I may say the first keel-timber—of a new navy, which all patriots must hope shall become the foremost in the world, it should be well begun in the selection of the first list of officers." (1775.)
2. "It is by no means enough that an officer of the navy should be a capable mariner. He must be that, of course, but also a great deal more. He should be as well a gentleman of liberal education, refined manners, punctilious courtesy, and the nicest sense of personal honor." (1775.)
3. "He should not only be able to express himself clearly and with force in his own language both with tongue and pen, but he should also be versed in French and Spanish—for an American officer particularly the former—for our relations with France must necessarily soon become exceedingly close in view of the mutual hostility of the two countries toward Great Britain." (1775.)
4. "All these considerations pertain to the naval officer afloat. But part, and often an important part, of his career must be in port or on duty ashore. He must be of affable temper and a master of civilities. He must meet and mix with his inferiors in rank in society ashore, and on such occasions he must have tact to be easy and gracious with them, particularly when ladies are present; at the same time with-

out the least air of patronage or affected condescension, though constantly preserving the distinction of rank." (1775.)

You no doubt know how well Jones lived up to these qualifications. If you are not certain, I have but to quote the remarkable statement of Benjamin Franklin: "No matter what the faults of Commodore Jones may be, I must confess to your ladyship that when face to face with him no man, nor, so far as I can learn, woman, can for a moment resist the strange magnetism of his presence, the indescribable charm of his manner; a commingling of the most compliant deference with the most perfect self-esteem I have ever seen in a man; and, above all, the sweetness of his voice and the purity of his language." Do not the words "strange magnetism of his presence, the indescribable charm of his manner" suit perfectly both Nelson and Napoleon?

III. INTERNATIONAL LAW

5. "The naval officer should be familiar with the principles of international law, and the general practice of admiralty jurisprudence, because such knowledge may often, when cruising at a distance from home, be necessary to protect his flag from insult or his crew from imposition or injury in foreign ports." (1775.)

During all his operations in European waters Jones made excellent use of his knowledge of international law, particularly when returning to France with his prize, *Drake,* when coming into Dutch territory at the Texel with the *Serapis* after the battle, and in the collection of the prize money for the prizes sent into neutral ports while on his cruise in the *Bon Homme Richard.* Thursfield makes the following comment: "I do not propose to deal at any length with this part of Jones' career, and need only remark here that in the conduct of the negotiations Jones displayed remarkable patience, perseverance, and diplomatic address, and handled the many difficult questions of international and maritime law involved with the touch of a master."

Nelson was also a master of maritime law. In the early part of his career he commanded *Boreas* on the Leeward Island station. Here he found that American ships were illegally trading with the islands. Although Nelson was able to show his flag officer that the law was plain in the case, his commander refused to take any

action to enforce it. The highest civil authorities protested violently against its enforcement. Nevertheless, Nelson seized four American ships at Nevis, for which he was sued for damages to the extent of 40,000 pounds. After a hard legal struggle Nelson was completely victorious and his commander was complimented for what Nelson had deliberately done against his orders.

IV. NATIONAL POLICY

6. "We should, at the earliest moment, have a squadron of four, five or six frigates constantly in British waters, harboring and refitting in the ports of France, which nation must, from self-interest alone, lean toward us from the start, and must sooner or later openly espouse our cause." (1775.)

This shows Jones' clear idea of national policy. His prophecy that France "must sooner or later openly espouse our cause" was quickly verified by the French Alliance drawn up three years later.

7. "A sharp battle now and then, or the capture and carrying as prize into a French port of one or two of their crack frigates, would raise us more in the estimation of Europe, where we now most of all need countenance, than could the defeat or even capture of one of their armies on the land here in America. And at the same time it will fill all England with dismay. If we show to the world that we can beat them afloat with an equal force, ship to ship, it will be more than anyone else has been able to do in modern times, and it will create a great and most desirable sentiment of respect and favor toward us on the Continent of Europe, where really, I think, the question of our fate must ultimately be determined." (1775.)

Jones here shows how strategy may gain moral and political results. With remarkable perception he saw even at that early date that our success depended upon the assistance we would receive from the European nations. Political results were, then, in this case the ones we should strive for. To gain these political results in Europe we must carry the war to Europe and beat the British in their own waters. It was indeed appropriate that Paul Jones should illustrate the principles thus laid down by one of the most brilliant achievements in all naval history.

V. DIPLOMACY

8. "The naval officer should also be conversant with the usages of diplomacy, and capable of maintaining, if called upon, a dignified and judicious diplomatic correspondence: because it often happens that sudden emergencies in foreign waters make him the diplomatic as well as the military representative of his country, and in such cases he may have to act without opportunity of consulting his civic or ministerial superiors at home, and such action may easily involve the portentous issue of peace or war between great powers." (1775.)

One is almost tempted to think that this passage was written after Jones had had his great diplomatic controversy at the Texel, because he was himself confronted with the very emergency he mentions here. After his action with the *Serapis,* his own ship sank; Jones hoisted his flag on the *Serapis* and, escorted by the *Alliance,* anchored in the Dutch harbor of the Texel. The British Ambassador demanded that he and his ships be handed over to the British Navy, contending that he was a pirate. Although in a most difficult position Jones conducted a most "dignified and judicious diplomatic correspondence" and finally won all his points. Not only this, but he incidentally brought about war between Holland and England, the latter country giving as one of her causes of war: "that in violation of treaty the States General suffered an American pirate (one Paul Jones, a rebel and state criminal) to remain several weeks in one of their ports; and even permitted a part of his crew to mount guard (with arms and munitions, under his authority) in one of their forts in the Texel." In order to illustrate the remarkable skill shown by Jones in this controversy, permit me to quote one of his notes to the States General:

High and Mighty Lords:

Begging your gracious and condescending consideration, I, Paul Jones, captain of the United States Navy, represent and humbly relate that before me has been laid copy of a letter addressed to Your High Mightinesses, under date of the 9th of the month of October, by His Excellency, Sir Joseph Yorke, Ambassador Extraordinary and Plenipotentiary of His Majesty the King of Great Britain. That in the said letter the said Sir Joseph Yorke states that "two of His Majesty's ships, the *Serapis* and the *Countess of Scarborough* arrived some days ago in the Texel, having been attacked and taken by force by a certain Paul Jones, a subject of the King,

who, according to the treaties and the laws of war, can only be considered as a rebel and a pirate."

And on this ground His Excellency Sir Joseph Yorke demands that the ships and crews be given up.

Also has been laid before me copy of memorial of said Sir Joseph Yorke, under date of the 29th of October, just past, renewing the said demand "most strong and urgent for the seizure and restitution of the said vessels as well as for the enlargement of their crews, who have been seized by the pirate, Paul Jones, a Scotchman, a rebellious subject, and a state criminal." Also conjuring Your High Mightinesses to "treat as pirates those whose letters (commissions) are found to be illegal for not being issued by a sovereign power."

May it please Your High Mightinesses, I conceive from the foregoing that the only question in dispute between His Excellency Sir Joseph Yorke and myself is the question whether my commission has been "issued by a sovereign power." If my commission has been issued by a sovereign power, then Sir Joseph Yorke's contention that I am a "pirate," etc., must fall.

The commission I hold, of which I transmit herewith a true copy and hold the original subject to examination by Your High Mightinesses or your authorized envoy for that purpose, and which original I have already exhibited to His Excellency Commodore Riemersma, commanding the fleet of Your High Mightinesses, now at anchor in these roads, is issued by the Congress of the United States of America in due form, signed by the President thereof and attested with the seal.

Such being true, the only question left to decide is the question whether the United States of America is a sovereign power.

On this question, I take it for granted that Your High Mightinesses will agree with me that neither Sir Joseph Yorke nor his master, the King of Great Britain, can be considered competent sole judge of last resort. If they could be so considered, then all questions of every description would be subject to *ex parte* decision by the arbitrary will of one party, in any contest—a doctrine which must, in the estimation of every judicial mind, be too preposterous to contemplate without levity.

Your High Mightinesses cannot fail to be aware that the question of the sovereignty of the United States of America has been passed upon by qualified and competent judges. That sovereignty has been recognized by His Most Christian Majesty the King of France and Navarre, in the form of a solemn treaty of amity and alliance done at Versailles nearly a year ago and now a *casus belli* in the estimation of His Majesty the King of Great Britain. The independence of the United States, and with it their rightful sovereignty, has been recognized by His Most Catholic Majesty the King of Spain and the Indies. The belligerent rights of the United States have been acknowledged by His Majesty Frederick II, King of Prussia, and by Her Imperial Majesty Catherine II, Empress of all the Russias.

It does not become me, who am only a naval officer of command rank, to enter upon discussion of the motives of statecraft which may have induced such attitudes or such action on the part of the august potentates

mentioned; but Your High Mightinesses will, I do not doubt, agree that it is within my province, humble as it may be, to invite attention to existing facts of common notoriety and concealed from no one. In the face of such evidence, there is before us, by way of rebuttal, nothing but the *ex parte* declaration of His Excellency Sir Joseph Yorke, in behalf of his master the King of Great Britain, a party principal in the case to be adjudicated.

And now, if I may for one moment further beg the patient indulgence of Your High Mightinesses, I recur to the language of His Excellency Sir Joseph Yorke, wherein, to fortify, apparently, his contention that I am "a rebellious subject and state criminal," he declares that I am not only "the pirate Paul Jones," but also that I am "a Scotchman."

Candor compels me, may it please Your High Mightinesses, to admit that this last, alone, of all Sir Joseph's allegations, is true and indisputable. But while admitting the truth of Sir Joseph's assertion of my Scottish birth, I deny the validity of his inference made plain by his context. That, under the circumstances now being considered, the fact of Scottish birth should be held to constitute the character of a "rebellious subject and state criminal," more than birth elsewhere within the dominions of the King of Great Britain, I do not conceive to be a tenable theory. It cannot have escaped the attention of Your High Mightinesses that every man now giving fealty to the cause of American Independence was born a British subject. I do not comprehend, nor can I conceive, a difference in this respect between birth as a British subject in Scotland and birth as a British subject in Virginia, Pennsylvania, New York, New England, or elsewhere on British soil, there being in the eyes of British law no difference between the soil of the parent realm and the soil of colonies in respect to the relations of the rights of the subject.

If the reasoning of Sir Joseph Yorke be sound, then General Washington, Dr. Franklin, and all other patriots of birth on the soil of America when a British colony, must be, equally with me, "state criminals." No formal proclamation has been made to that effect, within my knowledge, by due authority of the King and his Ministers. Whatever may be the impression of exigency, it is clear that the government of His Britannic Majesty has not yet undertaken to proclaim wholesale outlawry against nearly three millions of people now in arms for the cause of independence. Such proclamation seems to have been reserved for my special honor, in the port of a neutral state, and on the *ipse dixit* of an ambassador without express authority from Crown, Ministers, or Commons. It is inconceivable that so unauthorized a proceeding can have weight or that so unexampled an exception can prevail with the reason of so judicial a body as the Assembly of Your High Mightinesses.

With these humble representations I confidently repose trust in the traditional candor and in the infallible justice of the High and Mighty Lords of the States General of the Netherlands.

PAUL JONES,
Captain, U. S. Navy.

On Board the U. S. Ship *Serapis*.
November 4, 1779.

It is pleasing to note that, after the controversy had been settled in Jones' favor, Sir Joseph Yorke sent out provisions for the wounded prisoners, both British and American, with a note to the effect that "we all know that old England can never tell the difference between friends and foes among brave men wounded in battle, even if some of them may, peradventure, be rebels."

Another example of Paul Jones' diplomacy will be seen in his tactful negotiations which resulted in the first formal salute to the United States flag. Again you will see it in the way he obtained the *Bon Homme Richard*. All his efforts to obtain a ship had been baffled by the French Ministers. Jones then had the temerity to write a personal letter to the King of France, which Franklin expressly refused to authorize. As a result of this letter Jones was granted an audience with the King and stated his case so well that a ship was given him immediately.

VI. THE ART OF COMMAND

Paul Jones was a natural leader of men. His personal magnetism can very well be compared with that of Napoleon and Nelson. He had to a very marked degree that happy faculty of gaining the love and loyalty of his men. While this high form of leadership is largely a natural gift, Paul Jones carried out very carefully the principles he himself laid down at the beginning of the war.

9. "A navy is essentially and necessarily autocratic. True as may be the political principles for which we are now contending, they can never be practically applied on board ship, out of port or of soundings. This may seem a hardship, but it is nevertheless the simplest of truths. Whilst the ships sent forth by Congress may and must fight for the principles of human rights and republican freedom, the ships themselves must be ruled and commanded at sea under a system of absolute despotism." (1775.)

It would have been well had the leaders in the French Revolution remembered this principle. Their neglect of it made certain the many victories of the British during the Revolution and Empire.

10. "Coming now to view the naval officer aboard ship and in relation to those under his command, he should be the soul of tact, patience, justice, firmness, and charity." (1775.)

11. "No meritorious act of a subordinate should escape his attention or be left to pass without its reward, *even if the reward be only one word of approval.*" (1775.)

Please compare this with the well-known systems used by both Nelson and Napoleon and remember the wise words of Frederick the Great: "Men are ruled by two motives: by the fear of punishment, and the hope of reward. A ruler should search for unknown merit and reward men for worthy deeds performed in secret. He should pay attention to this and keep agents everywhere so as to be informed of meritorious deeds. *He should watch for good actions as tyrants do for conspiracies.*"

12. "Conversely, he should not be blind to a single fault in a subordinate, though, at the same time, he should be quick and unfailing to distinguish error from malice, thoughtfulness from incompetency, and well-meaning shortcoming from heedless or stupid blunder." (1775.)

13. "As he should be universal and impartial in his rewards and approval of merit, so should he be judicial and unbending in his punishment and reproof of misconduct." (1775.)

14. "In his intercourse with subordinates he should ever maintain the attitude of the commander, but that need by no means prevent him from the amenities of cordiality or the cultivation of good cheer within proper limits. Every commanding officer should hold with his subordinates such relations as will make them constantly anxious to receive invitations to sit at his mess-table, and his bearing toward them should be such as to encourage them to express their feelings to him with freedom and to ask his views without reserve." (1775.)

15. "It is always for the best interests of the service that a cordial interchange of sentiments and civilities should subsist between superior and subordinate officers aboard ship. Therefore it is the worst policy in superiors to behave toward their subordinates with indiscriminate hauteur, as if the latter were of a lower species. Men of liberal minds, themselves accustomed to command, can ill brook being thus set at naught by others who, from temporary authority, may claim a monopoly of power and sense for the time being. If such men experience rude, ungentle treatment from their superiors, it will create such heart-burnings

and resentments as are nowise consonant with that cheerful ardor and ambitious spirit that ought ever to be characteristic of officers of all grades. In one word, every commander should keep constantly before him the great truth, that to be well obeyed he must be perfectly esteemed." (1775.)

I especially invite your attention to the last two sentences of this paragraph.

16. "But it is not alone with subordinate officers that a commander has to deal. Behind them, and the foundation of all, is the crew. To his men the commanding officer should be prophet, priest and king! His authority when off shore being necessarily absolute, the crew should be as one man impressed that the captain, like the sovereign, "can do no wrong." This is the most delicate of all the commanding officer's obligations. No rule can be set for meeting it. It must ever be a question of tact and perception of human nature on the spot and to suit the occasion." (1775.)

One of his own officers describes the manner in which Paul Jones actually applied this principle: "I sailed in my time, with many captains; but with only one Paul Jones. He was the captain of captains. Any other commander I sailed with had some kind of method or fixed rule which he exerted to all under him alike. It suited some, and others not; but it was the same rule all the time and to everybody. Not so Paul Jones. He always knew every officer or man in his crew as one friend knows another. Those big black eyes of his would look right through a new man at first sight, and, maybe, see something behind him! At any rate, he knew every man, and dealt with each according to his notion. I have seen him one hour teaching the French language to his midshipmen, and the next hour showing an apprentice how to knot a "Turk's head" or make a neat coil-down of a painter. He was in everybody's watch, and everybody's mess all the time. In fact, I may say that any ship Paul Jones commanded was full of him himself all the time."

17. "If an officer fails in this, he cannot make up for such failure by severity, austerity, or cruelty. Use force and apply restraint or punishment as he may, he will always have a sullen crew and an unhappy ship." (1775.)

Compare the statement of Napoleon: "It is always the tendency of commanding officers to isolate themselves from their men; a very bad tendency. A system of subordination founded on nothing but force is always liable to break down under any unforeseen accident."

18. "But force must be used sometimes for the ends of discipline. On such occasions the quality of the commander will be most sorely tried." (1775.)

Several years later when commanding *Bon Homme Richard* Jones amplified this statement as follows: "I have no use for the cat. Whenever a sailor of mine gets vicious beyond my persuasion or control, the cheapest thing in the long run is to kill him right away. If you do that the others will understand it. But if you trice him up and flog him, all the other bad fellows on the ship will sympathize with him and hate you." You must remember that Jones lived in a day when entire British fleets mutined and it was not uncommon for a crew to seize a ship at sea and go off on a pirate cruise. Quick remedies were necessary for such dangerous diseases, and Jones had himself been forced to kill a mutinous seaman when he was a merchant captain. His stand against the cruel punishment of the "cat" was very well taken; he only allowed it to be used twice during his whole career and then made the punishment very light.

19. "When a commander has, by tact, patience, justice, and firmness, each exercised in its proper turn, produced such an impression upon those under his orders in a ship of war, he has only to await the appearance of his enemy's topsails upon the horizon. He can never tell when that moment may come. But when it does come he may be sure of victory over an equal or somewhat superior force, or honorable defeat by one greatly superior. Or, in rare cases, sometimes justifiable, he may challenge the devotion of his followers to sink with him alongside the more powerful foe, and all go down together with the unstricken flag of their country still waving defiantly over them in their ocean sepulchre. No such achievements are possible to an unhappy ship with a sullen crew." (1775.)

It is a singular coincidence that Paul Jones should himself have so completely applied his own principles, have inspired a

motley crew with such a wonderful fighting spirit, and even have been able, as he says, to "challenge the devotion of his followers to sink with him alongside the more powerful foe." In this respect I quote for you the evidence of Captain Pearson of the *Serapis:* "Long before the close of the action it became clearly apparent that the American ship was dominated by a commanding will of the most unalterable resolution, and there could be no doubt that the intention of her commander was, if he could not conquer, to sink alongside. And this desperate resolve of the American captain was fully shared and fiercely seconded by every one of his ship's company. And, if the honorable court may be pleased to entertain an expression of opinion, I will venture to say that if French seamen can ever be induced by their own officers to fight in their own ships as Captain Jones induced them to fight in his American ship, the future burdens of His Majesty's Navy will be heavier than they have heretofore been."

At a later time when Jones commanded the 36-gun frigate *Alliance* his crew sent to him a petition signed by every man in the ship in the order of rating: "We respectfully request you, sir, to lay us alongside any single-decked English ship, or any double-decked ship under a 50." You may easily see the spirit of a Paul Jones crew.

VII. STRATEGY AND TACTICS

We must first consider the principles Paul Jones laid down for the use of our navy in the Revolutionary War. He believed that our navy then could not hope "to contend with Britain for the mastery of the sea on a grand scale." Accordingly these strategic principles will apply to a navy which cannot operate "on a grand scale." Later he gave his opinions as to the strategic principles which should be followed by the French Navy, one which could operate "on a grand scale."

20. "Such ships (ships of the line) are too large and costly both in building and in keeping in commission, and require too many men for our present resources. Their use is mainly strategical, for which purpose they must operate in fleets and squadrons, calculated to fight ranged battles, or to make extensive demonstrations, or to protect military expeditions oversea, or to overawe inferior powers. The

posture of our affairs does not present such requirements. We cannot hope to contend with Britain for mastery of the sea on a grand scale. We cannot for a long time hope for conditions admitting of such an attitude. As it is, only four powers are able to maintain fleets of the line capable of standing up in ranged battle. They are England, France, Spain and the Netherlands, and their fleets are the growth of centuries." (1775.)

In this advice to Congress Jones very wisely saw that we could not hope to contend with the mother country on a grand scale, and that it would be practically impossible to build a squadron of ships of the line. However, he maintained that we should do something more then operate against the British trade alone.

21. " I would not go to the other extreme and counsel the fitting out of small vessels able only to harass the enemy's commerce. That character of sea warfare may, I think, be left in the main to the enterprise or cupidity, or both, of private individuals or associations who will take out letters-of-marque or equip privateers." (1775.)

Jones desires to build at least six large frigates carrying thirty-six 12-pounders.

22. " I would not counsel smaller ones, such as 28's or even 32's; because the drift of progress is to make frigates heavier all the time, and anything inferior to the 12-pounder 36-gun frigate is now behind the times. On the other hand, I would take a step further than the English and French have yet gone in frigate design. I would create a class of 18-pounder frigates to rate 38 or 40 guns. By this means we shall have a ship of frigate build and rate, but one-half again stronger than any other frigate now afloat. In addition to the six already proposed to carry 12-pounders, it would be wise to provide for at least four of the new class of 18-pounder frigates, and if possible six." (1775.)

23. " We should, at the earliest moment, have a squadron of four, five, or six frigates like the above constantly in British waters." (1775.)

Here Jones shows his liking for the offensive. He repeated this plea for attacking the enemy in his own waters time after time. Finally he was the one selected to put it into effect. After the action between the *Ranger* and the *Drake* he wrote: " The

behavior of my men in this engagement more than justifies the representations I have so often made to you of what American sailors would do if given a chance at the enemy in his own waters. We have seen that they act with courage on their own coast. But no one has ever seen them fight on their own coast as they fought here, almost in hail of the enemy's shore."

24. "Keeping such a squadron in British waters, alarming their coasts, intercepting their trade, and descending now and then upon their least protected ports, is the only way that we, with our slender resources, can sensibly affect our enemy by sea-warfare. Rates of insurance will rise; necessary supplies from abroad, particularly naval stores for the British dockyards, will be cut off; transports carrying troops and supply ships bringing military stores for land operations against us will be captured; and last, but not least, a considerable force of their ships and seamen will be kept watching or searching for our frigates." (1775.)

Three years later Jones was able to carry out an expedition in the Irish Sea along the lines he suggests above. He states the results of this expedition as follows: "Its actual results were of little moment, for the intended destruction of shipping was limited to a single vessel. But the moral effect of it was very great, as it taught the British that the fancied security of their coasts was a myth, and thereby compelled their government to take expensive measures for the defence of numerous ports hitherto relying for protection wholly on the vigilance and supposed omnipotence of their navy. It also doubled or more the rates of insurance, which in the long run proved the most grievous damage of all."

The soundness of Jones' principles is proved by Disraeli's statement about this raid into British waters. "The descent at Whitehaven produced consternation all over the kingdom. Expresses were immediately despatched to all the capital seaports; all strangers in Whitehaven were immediately ordered to be arrested; similar directions were forwarded throughout the country. Look-out vessels were appointed at every port; continual meetings were held all down the coast; companies were raised by subscription; and all forts and guns were immediately put into condition. Rumor increased the terror for which there was but good reasons. The daily journals teemed hourly with circumstantial accounts of strange 74's seen in the Channel, of expeditions which were never

planned, and destruction which never occured! In one night Paul Jones was in all parts of England, and his dreadful name was sufficient for surveys of fortifications, and subscriptions to build them."

25. "In planning and building our new frigates I would keep fast sailing, on all points, in view as a prime quality. But no officer of true spirit would conceive it his duty to use the speed of his ship in escape from an enemy of like or nearly like force. If I had an 18-pounder frigate of the class above described, I should not consider myself justified in showing her heels to a 44 of the present time, or even to a 50-gun ship, built ten years ago." (1775.)

26. "Beyond this, if by exceedingly desperate fighting, one of our ships shall conquer one of theirs of markedly superior force, we shall be hailed as the pioneers of a new power on the sea, with untold prospects of development, and the prestige, if not the substance, of English dominion over the ocean will be forever broken. Happy, indeed, will be the lot of the American captain upon whom fortune shall confer the honor of fighting that battle!" (1775.)

"With this in view, I would not deem it a misfortune if I fell in with a ship of the enemy superior enough in force to make the taking of her an event of more than ordinary note. Mindful of all I have said and written to you about the great moral benefit which would accrue to our cause from a striking or, maybe, startling naval success, demonstrating our ability to cope with the English on the element they have so long and so arrogantly ruled, I shall welcome the approach of such a ship. All I hope for is the chance; and if such opportunity shall come to me, rest assured that I shall improve it in a manner not soon to be forgotten by the world and that neither our country nor the enemy can ever forget." (1778. Before sailing in the *Bon Homme Richard.*)

These two noble paragraphs, so wonderfully illustrated by the action with the *Serapis,* should be the guiding principles of every American naval officer.

During the later years of his life Paul Jones wrote a number of papers and letters on the subject of naval tactics and strategy "on a grand scale." Although Jones never had the opportunity

of applying these principles—save at the battle of the Liman when he was in the Russian service—they are most intensely interesting and compare most closely with those stated by all the great captains.

27. "If midnight study and the instruction of the greatest and most learned sea-officers can give me advantages, I am not without them." (1782.)

You see that Paul Jones recognized the necessity of "midnight study and the instruction of the greatest and most learned sea-officers." Napoleon agreed with him: "If I appear to be always ready to reply to everything, it is because, before undertaking anything, I have meditated a long time—I have forseen what might happen. It is not a spirit which suddenly reveals to me what I have to say or do in a circumstance unexpected by others—it is reflection, meditation."

28. "A captain of the line at this day must be a tactician." (1782.)

In this respect Jones further says: "I confess, however, I have yet to learn; it is the work of many years' study and experience to acquire the high degree of science necessary for a great sea-officer. Cruising after merchant ships, the service in which our frigates have generally been employed, affords, I may say, no part of the knowledge necessary for conducting fleets and their operations. A captain of a cruising frigate may make shift without ever having heard of naval tactics. Until I arrived in France, and became acquainted with that great tactician, Count D'Orvilliers, and his judicious assistant the Chevalier du Pavillion, who, each of them, honored me with instructions respecting the science of governing the operations, etc., of a fleet, I confess I was not sensible how ignorant I had been, before that time, of naval tactics."

29. "I have noticed—and no reader of the naval history of France can have failed to notice it—that the underlying principle of operation and rule of action in the French Navy have always been calculated to subordinate immediate or instant opportunities to ulterior if not distant objects. In general, I may say that it has been the policy of French admirals in the past to neutralize the power of their adversaries, if possible, by grand maneuvers rather than to destroy it by grand attacks." (1791.)

Jones continues: "A case in point of this kind is the campaign of the Count de Grasse in his conjoint operation with the land forces of General Washington and the Count de Rochambeau, which so happily resulted in the capitulation of Cornwallis at Yorktown. It is well known to you, as an officer of important command in the French fleet on that occasion, that for at least three days—that is to say, from the moment when Admiral Graves appeared off the Capes (of the Chesapeake) until he beat his final retreat to New York—it was in the power of the Count de Grasse to bring him to close decisive action with a superiority of force that could have left no doubt as to the issue. It is true, as may be said, that the ulterior object of the grand strategy in that operation, viewed by land as well as by sea, was accomplished by the skillful maneuvering, the imposing demonstration, and the distant cannonade practiced by the Count de Grasse, without determined attack or persistent pursuit. It may be also urged—which I have heard from the Marquis de Vaudreuil and the Chevalier de Barras—that de Grasse was hampered in this respect by the nature of his agreement with de Rochambeau, approved by Washington, that it should be the policy to preserve the French fleet from the contingencies of close action, so far as might be done without sacrificing its efficiency in the adjunctory sense to the operations by land."

30. "Yet, admitting all this in force, it has always seemed to me that there was a moment when the—perhaps unexpected—development of weakness and uncertitude on the part of Admiral Graves afforded de Grasse abundant justification for revision if not momentary discarding of the terms of any prior understanding he may have had with de Rochambeau and Washington." (1791.)

"De Grasse had more ships, more men, and more guns than Graves had. His ships were better found and sailed faster, either ship for ship, or measuring the maneuvering power of the fleet by the slowest or dullest of all, than the ships of Graves. In my judgment, there has never been an occasion in all the naval wars between France and England when the opportunity was so distinctly and so overwhelmingly on the side of France as in those few October days in 1781, off the Capes of the Chesapeake—when France actually had, for the moment, command of the sea. Now, my dear Kersaint, you know me too well to accuse me of

self-vaunting. You will not consider me vain, in view of your knowledge of what happened in the past off Carrickfergus, off Flamboro' Head, and off the Liman in the Black Sea, if. . . ."

31. "I say that, had I stood—fortunately or unfortunately—in the shoes of de Grasse, *there would have been disaster to some one off the Capes of the Chesapeake;* disaster of more lasting significance than an orderly retreat of a beaten fleet to a safe port. To put it a little more strongly, *there was a moment when the chance to destroy the enemy's fleet would have driven from me all thought of the conjoint strategy of the campaign as a whole.*" (1791.)

Only three years after this Nelson wrote: "Sure I am, had I commanded on the 14th, that either the whole French fleet would have graced my triumph, or I should have been in a confounded scrape." Napoleon said: "There are in Europe many good generals, but they see too many things at once; as for me I see only one thing, namely, the enemy's main body, I try to crush it, confident that secondary matters will settle themselves."

32. "I have never been able to contemplate with composure the theory of the purely defensive in naval tactics." (1791.)

"With all due respect to the sensibilities of Frenchmen I make bold to say that better models of action are to be found in Hawke at Quiberon Bay, and in Rodney off Santa Lucia and Dominica than in de Grasse, either when successful in the Chesapeake or when beaten in the West Indies."

33. "I have never since ceased to mourn the failure of the Count de Grasse to be as *imprudent* as I could not have helped being on that grandest of all occasions." (1791.)

Compare this with Napoleon's saying: "In war the worst course is nearly always the most timid course, or, if you like to call it, the most *prudent* course."

34. "Howbeit, as I have already said, the object of grand strategy in that operation was accomplished by the maneuvering of the Count de Grasse without general action-in-line. But I confess that under similar conditions the temptation to destroy as well as repulse the fleet of the enemy would have been resistless, had I been the commander. It would have cost more men and perhaps a ship or two; but, in my

opinion, success in naval warfare is measured more perfectly by the extent to which you can capture or sink the ships and kill the seamen of the enemy than by the promptness with which you can force him, by skillful maneuver or distant cannonade, to sheer off, and thereby, with your consent, avoid a conflict that can hardly result otherwise than in conquest for you and destruction to him. To me war is the sternest and the gloomiest of all human realities, and battle the cruelest and most forbidding of all human practices. Therefore I think that the true duty of every one concerned in them is to make them most destructive while they last, in order that the cause of real humanity may be gained by making them soonest ended." (1791.)

Napoleon's opinion is as follows: "A battle should not merely be fought so as to gain a victory, but so as to complete the annihilation of the organized corps of the enemy." Or again: "The Emperor will personally follow on the enemy's heels. It is his opinion that in war nothing is done as long as anything remains to be done; no victory is complete as long as there is an enemy in the field. In the position in which we are there is only one order to be issued, viz., to inflict as heavy losses on the enemy as possible and improve our victory in every way." Nelson said the same thing: "Now had we taken ten sail, and had allowed the eleventh to escape, when it would have been found possible to have got at her, I could not have called it well done." Again he says after the battle of the Nile: "I regret that one escaped, and I think, if it had pleased God that I had not been wounded, not a boat would have escaped to tell the tale."

Paul Jones continues his letter as follows: "You will by no means infer from these cursory observations that I fail to appreciate, within my limited capacity, the grandeur of the tactical combinations, the skill of the intricate maneuvers, and the far-sighted, long thought-out demonstrations by which the Count de Toulouse drove Rooke out of the Mediterranean in August, 1704, with no more ado than the comparatively bloodless battle off Malaga; or the address with which La Galissoniere repulsed Byng from Minorca in 1756 by a long-range battle of which the only notable casualty was the subsequent execution of Byng by his own government for the alleged crime of failing to destroy the fleet opposed to him, or the brilliant campaign of my noble friend, the Count D'Orvilliers, off Ushant in July, 1778, when he forced

Keppel to retreat ignominously to England; not by stress of defeat, but by the cunningly planned and adroitly executed expedient of avoiding, on any terms but his own, the battle which Keppel vainly tried to force upon him. Let me assure you that none of these great events has been lost upon my sense of admiration."

35. "And yet one reflection persecutes me, to mar all my memories and baffle all my admiration. This is the undeniable fact that the English ships and English sailors whom La Galissoniere maneuvered away from Minorca, under Byng, in 1756, remained intact and lived to ruin Conflans in Quiberon Bay three years later under Sir Edward Hawke; and the ships and seamen of Graves, whom de Grasse permitted to escape from his clutches off the Capes of the Chesapeake in October, 1781, were left intact, and lived to discomfit de Grasse himself off Santa Lucia and Dominica in April, 1782, under Rodney." (1791.)

36. "You know of course that my own opportunities in naval warfare have been but few and feeble in comparison with such as I have mentioned. But I do not doubt your ready agreement with me if I say that *the hostile ships and commanders that I have thus far enjoyed the opportunity of meeting, did not give any one much trouble thereafter.*" (1791.)

37. "The rules of conduct, the maxims of action, and the tactical instincts that serve to gain small victories may always be expended into the winning of great ones with suitable opportunity; *because in human affairs the sources of success are ever to be found in the fountains of quick resolve and swift stroke; it seems to be a law inflexible and inexorable that he who cannot risk cannot win.*" (1791.)

38. "I hope that France, in her struggle for liberty, may, as America did, find use for me, no matter in what capacity or what grade of my profession—from a sloop-of-war to a fleet—on the high seas. But, should France thus honor me, it must be with the unqualified understanding that I am not to be restricted by the traditions of her naval tactics; but with full consent that I may, on suitable occasion, to be decreed by my judgment on the spot, try conclusions with her foes to the bitter end or death, at shorter range and at closer quarters than have hitherto been sanctioned by her tactical authorities." (1791.)

Napoleon said: "The great weakness of our navy is that the men who command it are inexperienced in all the hazards of command. I looked unceasingly for the right naval officer without being able to find him. In that profession there is a specialty, a technicality, which put a limit to all my conceptions. No sooner did I propose a new idea than I had Ganteaume and the Navy Department on my back. "Sire, that is impossible. And why? Sire, the winds do not permit of it; and then the calms, the currents." And I was stopped short. If, instead of having to combat obstacles, I had met someone who agreed with me and furthered my views, what results might we not have obtained? But during my reign, there never appeared in the navy a single man who deviated from routine and knew how to originate."

As the great master mused this way at St. Helena he might well have thought of Paul Jones and said: "If he had lived it would all have been different."

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

LETTERS ON NAVAL STRATEGY

BASED ON THE NAVAL CAMPAIGN OF 1805

(CONCLUDED)

By LIEUTENANT HOLLOWAY H. FROST, U. S. Navy

EIGHTH LETTER

1. CALDER'S DECISION

You will remember that Calder left Brest on August 16. His squadron was composed of the following ships:

Prince of Wales (Vice Admiral Calder)	98 guns.
Britannia (Rear Admiral Northesk)	100 guns.
Canopus (Rear Admiral Louis)	80 guns.
Spencer	74 guns.
Spartiate	74 guns.
Donegal	74 guns.
Tigre	74 guns.
Swiftsure	74 guns.
Conqueror	74 guns.
Leviathan	74 guns.
Prince	98 guns.
Temeraire	98 guns.
Neptune	98 guns.
Revenge	74 guns.
Zealous	74 guns.
Defence	74 guns.
Orion	74 guns.
Polyphemus	64 guns.
A total of	23 units.

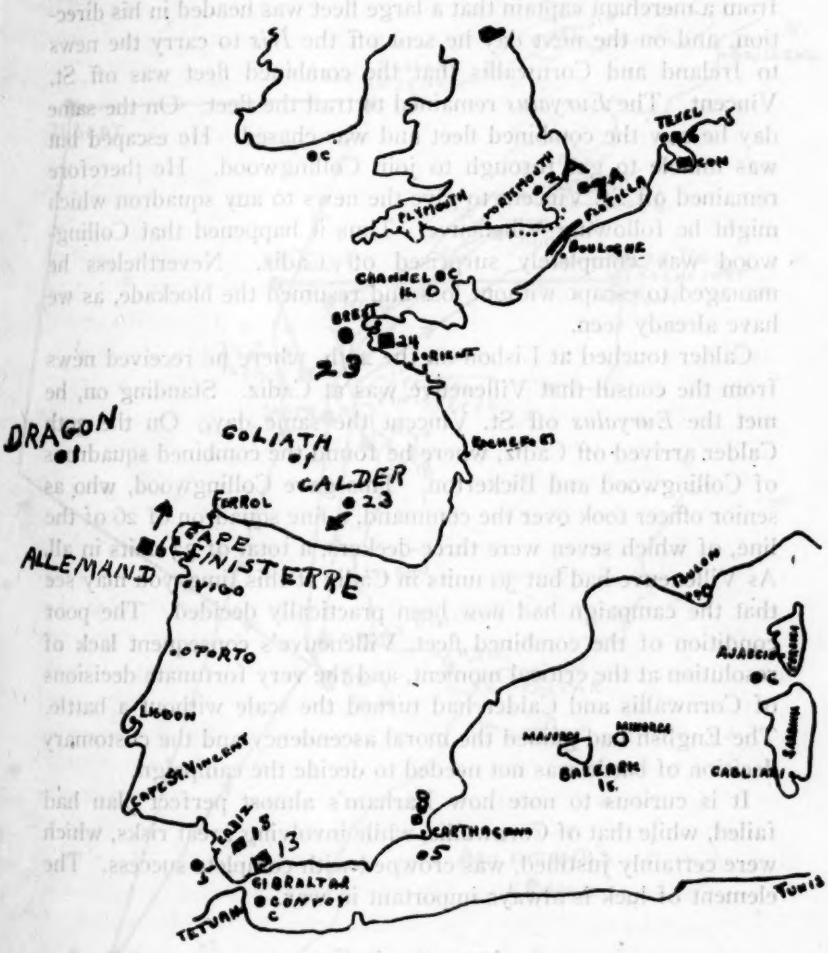
He was also to have the *Dragon* (74 guns) and *Goliath* (74 guns), which were to the southward. Cruisers: *Sirius* and *Attack*.

On the 20th Calder was still in the Bay of Biscay, having been held up by contrary winds. On this date, when Villeneuve was entering Cadiz, Calder met the frigate *Naiad* which, as you will remember, had trailed Villeneuve to the westward on the 14th.

Calder now changed his course a little to the northward, apparently with the intention of intercepting Villeneuve, but soon changed back so as to head direct for Ferrol. He sent the gunboat *Attack* on ahead to reconnoiter. On the 21st he arrived off Ferrol and saw that the combined fleet was not there, but received news that Allemand with the French Rochefort squadron was at Vigo. He therefore continued on to Cape Finisterre. Here one of his cruisers brought in word from a merchant captain that Villeneuve had left Ferrol on the 14th with 29 of the line and 10 cruisers and had disappeared to the westward. By the next morning (the 22d) Calder had passed Finisterre and was standing toward Vigo in the hope of meeting Allemand. In the evening he heard that Allemand had left Vigo four days before and that when last seen he was headed to the north. At the same time a frigate arrived from Cadiz reporting having seen nothing on the way up.

Now Calder had to make his decision. Let us see what information he had First, he knew from several sources that Villeneuve had left Ferrol on the 13th or 14th of August with 29 of the line and had headed to the westward. The great question was as to whether he had gone north or south. He had information that Allemand had gone north, but then why had he not met Allemand, having been directly in his path? A frigate coming from the south had not seen the combined fleet, but this proved little, as Villeneuve had probably not taken a direct course. Thus he had really no information of any value concerning Villeneuve's destination. Suppose Villeneuve had gone north and Calder now remained in his present position or went to the south! This would put Cornwallis in a perilous position. Suppose Villeneuve had gone south, and Calder went north or remained in his present position! Then Villeneuve could crush Collingwood and Bickerton, rally the Spanish ships at Cadiz and Carthagena and return to the north again with greatly increased numbers. Thus Calder had one chance in two of guessing Villeneuve's destination. If he guessed correctly and sailed immediately, all would be well. If he guessed wrong and sailed immediately, there was danger of a great disaster. But if he held his position and did nothing he would practically waste his whole squadron. He therefore decided to act and he guessed correctly. On the 22d Calder started south along the coast of Portugal.

It is probable that the one thing which did the most to cause this decision was the report that Allemand had gone north, followed by his failure to appear after Calder had apparently covered his route in that direction. It is a curious fact that Allemand had



actually gone north, missing Calder by the greatest luck, in some way that has never been explained.

In the meantime, the frigate *Iris* which had been chased away from the combined fleet on the 14th, was heading to the southward to warn Collingwood at Cadiz. Off the Portuguese coast

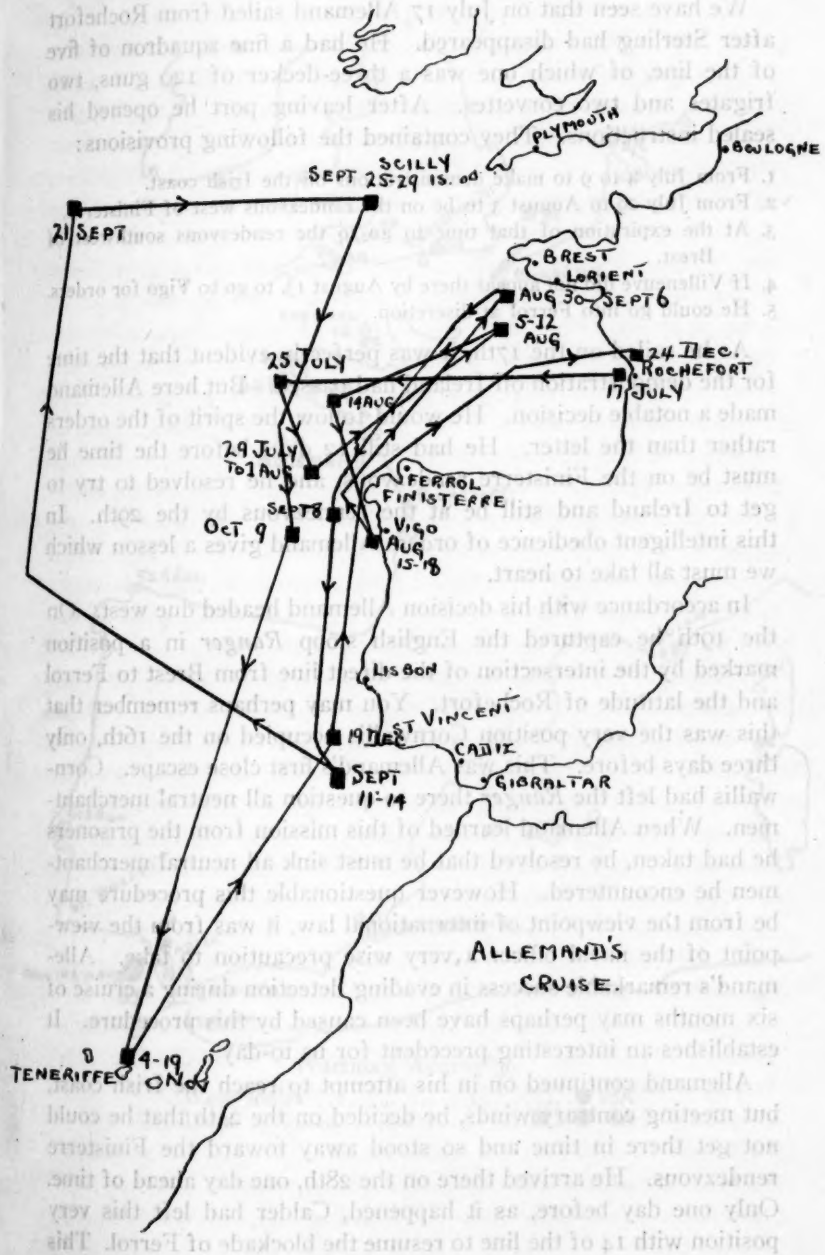
she fell in with the frigate *Euryalus,* commanded by the famous Captain Blackwood. These two ships then cruised for the combined fleet off Cape St. Vincent, after the news which the *Iris* carried had been sent into Lisbon. On the 18th Blackwood heard from a merchant captain that a large fleet was headed in his direction, and on the next day he sent off the *Iris* to carry the news to Ireland and Cornwallis that the combined fleet was off St. Vincent. The *Euryalus* remained to trail the fleet. On the same day he saw the combined fleet and was chased. He escaped but was unable to get through to join Collingwood. He therefore remained off St. Vincent to give the news to any squadron which might be following Villeneuve. Thus it happened that Collingwood was completely surprised off Cadiz. Nevertheless he managed to escape without loss and resumed the blockade, as we have already seen.

Calder touched at Lisbon on the 24th, where he received news from the consul that Villeneuve was at Cadiz. Standing on, he met the *Euryalus* off St. Vincent the same day. On the 30th Calder arrived off Cadiz, where he found the combined squadrons of Collingwood and Bickerton. This gave Collingwood, who as senior officer took over the command, a fine squadron of 26 of the line, of which seven were three-deckers, a total of 33 units in all. As Villeneuve had but 30 units in Cadiz at this time, you may see that the campaign had now been practically decided. The poor condition of the combined fleet, Villeneuve's consequent lack of resolution at the critical moment, and the very fortunate decisions of Cornwallis and Calder had turned the scale without a battle. The English had gained the moral ascendency and the customary decision of battle was not needed to decide the campaign.

It is curious to note how Barham's almost perfect plan had failed, while that of Cornwallis, while involving great risks, which were certainly justified, was crowned with complete success. The element of luck is always important in war.

2. ALLEMAND'S CRUISE

In examining the operations of Calder and Villeneuve we have touched in many places on the plan and actions of the Rochefort squadron. We must now make a more detailed exposition of this memorable cruise, which in many features is unique in history and from which we may learn many valuable lessons.


PLYMOUTH
BOULOGNE
SCILLY
SEPT 25-29 18. 00
21 SEPT
BREST
LORIENT
AUG 30 SEPT 6
S-12 AUG
24 DEC.
ROCHEFORT
17 JULY
25 JULY
14 AUG
29 JULY TO 1 AUG
FERROL
FINISTERRE
SEPT 8
OCT 9
VIGO
AUG 15-18
LISBON
ST VINCENT
19 DEC
CADIZ
GIBRALTAR
SEPT 11-14
TENERIFFE
9-19
ALLEMAND'S CRUISE.

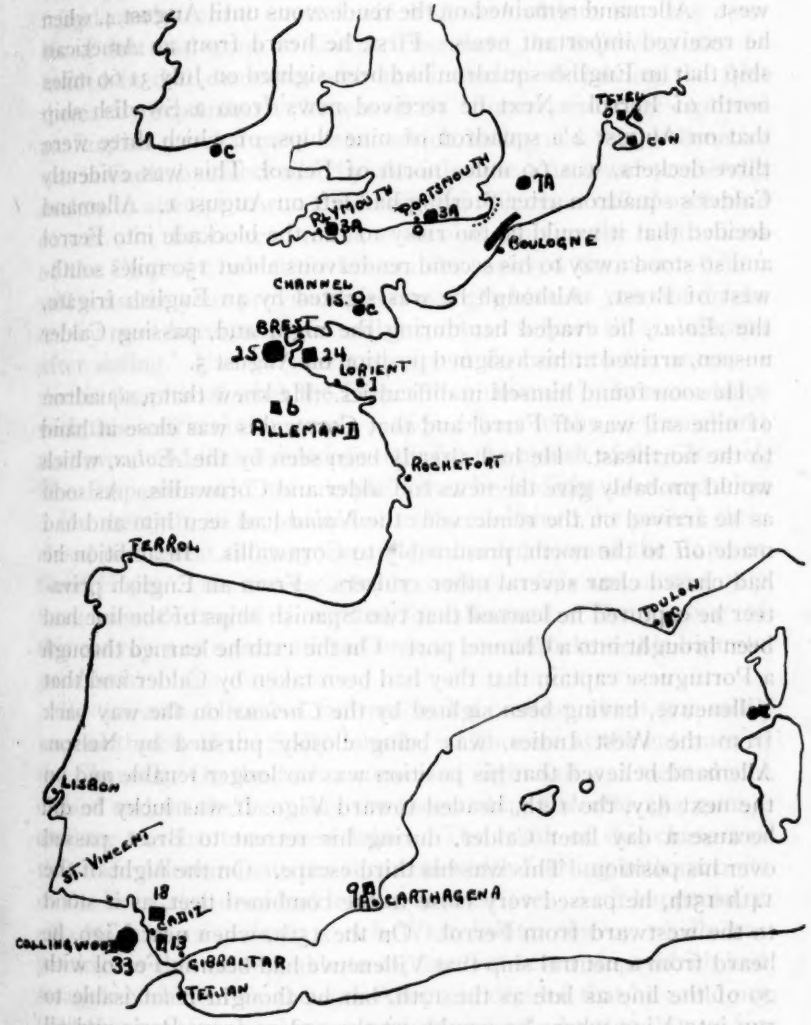
We have seen that on July 17 Allemand sailed from Rochefort after Sterling had disappeared. He had a fine squadron of five of the line, of which one was a three-decker of 120 guns, two frigates and two corvettes. After leaving port he opened his sealed instructions. They contained the following provisions:

1. From July 4 to 9 to make demonstrations off the Irish coast.
2. From July 29 to August 3 to be on the rendezvous west of Finisterre.
3. At the expiration of that time to go to the rendezvous southwest of Brest.
4. If Villeneuve did not appear there by August 13, to go to Vigo for orders.
5. He could go into Ferrol at discretion.

As he sailed on the 17th, it was perfectly evident that the time for the demonstration off Ireland had passed. But here Allemand made a notable decision. He would follow the spirit of the orders rather than the letter. He had still 12 days before the time he must be on the Finisterre rendezvous, and he resolved to try to get to Ireland and still be at the rendezvous by the 29th. In this intelligent obedience of orders Allemand gives a lesson which we must all take to heart.

In accordance with his decision Allemand headed due west. On the 19th he captured the English sloop *Ranger* in a position marked by the intersection of the direct line from Brest to Ferrol and the latitude of Rochefort. You may perhaps remember that this was the very position Cornwallis occupied on the 16th, only three days before. This was Allemand's first close escape. Cornwallis had left the *Ranger* there to question all neutral merchantmen. When Allemand learned of this mission from the prisoners he had taken, he resolved that he must sink all neutral merchantmen he encountered. However questionable this procedure may be from the viewpoint of international law, it was from the viewpoint of the naval officer a very wise precaution to take. Allemand's remarkable success in evading detection during a cruise of six months may perhaps have been caused by this procedure. It establishes an interesting precedent for us to-day.

Allemand continued on in his attempt to reach the Irish coast, but meeting contrary winds, he decided on the 24th that he could not get there in time and so stood away toward the Finisterre rendezvous. He arrived there on the 28th, one day ahead of time. Only one day before, as it happened, Calder had left this very position with 14 of the line to resume the blockade of Ferrol. This was Allemand's second narrow escape.



POSITIONS, AUGUST 30.

West Indies ..... ● 10A
India ..... ■ 1 ● 8A

On the 29th Allemand sent out one frigate and two corvettes to within 35 miles of Finisterre and the other frigate to the northwest. Allemand remained on the rendezvous until August 4, when he received important news. First, he heard from an American ship that an English squadron had been sighted on July 31 60 miles north of Ferrol. Next he received news from a Swedish ship that on August 2 a squadron of nine ships, of which three were three-deckers, was 60 miles north of Ferrol. This was evidently Calder's squadron after Sterling had left on August 1. Allemand decided that it would be too risky to run the blockade into Ferrol and so stood away to his second rendezvous about 150 miles southwest of Brest. Although he was sighted by an English frigate, the *Æolus,* he evaded her during the night and, passing Calder unseen, arrived at his assigned position on August 5.

He soon found himself in difficulties. He knew that a squadron of nine sail was off Ferrol and that Cornwallis was close at hand to the northeast. He had already been seen by the *Æolus,* which would probably give the news to Calder and Cornwallis. As soon as he arrived on the rendezvous the *Naiad* had seen him and had made off to the north, presumably to Cornwallis. In addition he had chased clear several other cruisers. From an English privateer he captured he learned that two Spanish ships of the line had been brought into a Channel port. On the 11th he learned through a Portuguese captain that they had been taken by Calder and that Villeneuve, having been sighted by the *Curieux* on the way back from the West Indies, was being closely pursued by Nelson. Allemand believed that his position was no longer tenable and on the next day, the 12th, headed toward Vigo. It was lucky he did because a day later Calder, during his retreat to Brest, passed over his position. This was his third escape. On the night of the 14th-15th, he passed very close to the combined fleet, as it stood to the westward from Ferrol. On the 15th, when near Vigo, he heard from a neutral ship that Villeneuve had been in Ferrol with 29 of the line as late as the 12th, but he thought it advisable to run into Vigo where he would get the orders from Paris and all the late information. He entered Vigo on the same day, the 15th. Here he found Villeneuve's order to proceed to Ferrol, and if the combined fleet was not there, to go to the Brest rendezvous. Accordingly Allemand left on the 18th, passed Calder in some mysterious way off Finisterre, and seeing that the combined fleet

was not in Ferrol, headed for the Brest rendezvous, arriving there on August 30. Here he remained until September 5, when he obtained news from a neutral which convinced him that the combined fleet had gone to Cadiz. Therefore the following day he headed in that direction with the intention of joining the fleet there. By September 11 he was off St. Vincent, and there captured an English merchantman from which he learned that Villeneuve was in Cadiz, but blockaded by 26 of the line. As it was practically useless to attempt to run this blockade, Allemand called a council of war. In this he read to the assembled captains the instructions of the Emperor, which in his opinion covered the case: "You will consume your provisions in cruising wherever you can do the enemy most harm, and you will not return to port till six months after sailing. Use all your audacity to do harm to the enemy—that is the pith of what the Emperor commands." In accordance with this instruction he made a wide detour to the westward and northward and then headed directly for the mouth of the Channel. The Emperor could not complain that he had not used audacity.

On the 15th, as he proceeded to the westward, he passed close ahead of a great military expedition headed toward the Cape of Good Hope. This was escorted by only two 64's and must surely have been destroyed if sighted by Allemand. The missing of this convoy was a taste of bad luck to counterbalance his hitherto good luck.

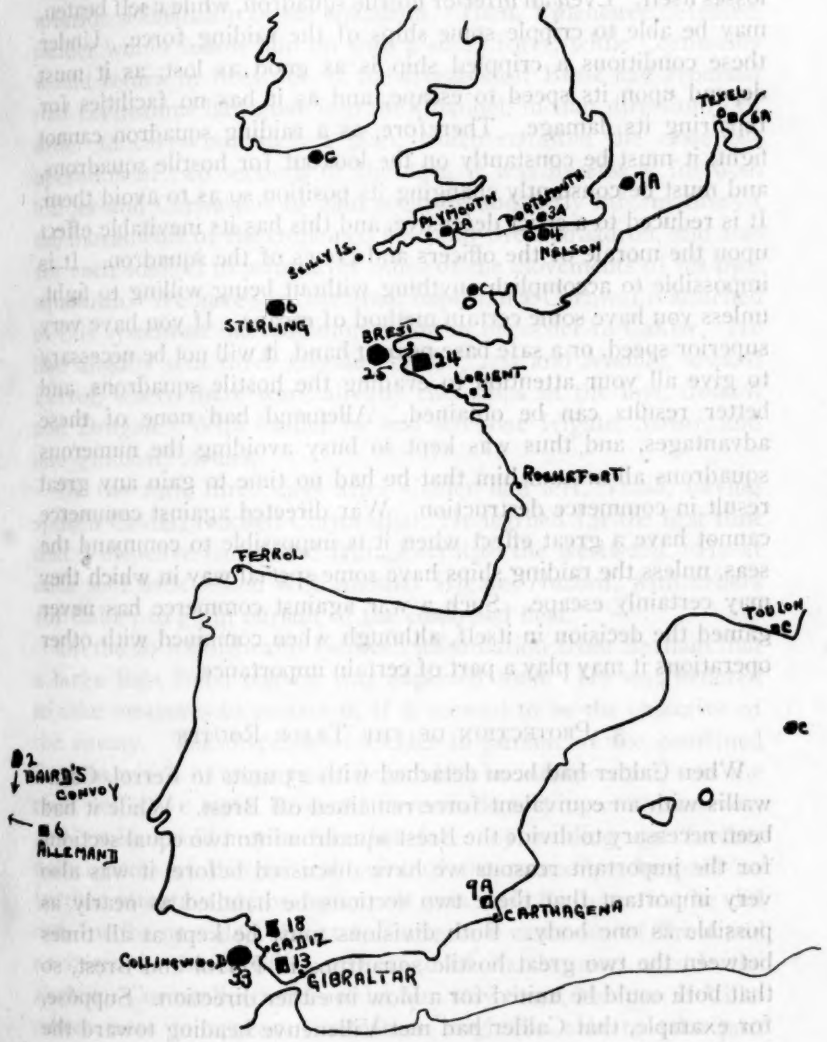
By the 20th Allemand had reached a position about 300 miles westsouthwest of the Scilly Islands, which were at the entrance to the Channel. On the 24th a convoy of eight sail was sighted and chased and on the next day the escort ship, *Calcutta* (54 guns), and one merchantman were taken. The result of this chase was that it led Allemand into the very area which Sterling with six units of the Brest squadron had left six days before. As it happened, it also led him away from a rich West Indian convoy which was passing, so that he was able to capture but seven ships which had straggled behind. By the 29th Allemand decided that he could not hold this position any longer, and accordingly he stood away for Vigo. This was a lucky decision, because Cornwallis with his whole squadron was after him and indeed reached Allemand's cruising ground but a day after he had left.

Off Finisterre Allemand had another narrow escape. Cornwallis had sent Strachan with five two-deckers to keep watch for

Allemand off Finisterre, but the latter passed within a few miles of him in some mysterious manner. On October 9 Allemand sighted the *Agememnon* (64 guns) on her way to join the blockading squadron at Cadiz. He chased, but the *Agamemnon* finally escaped. Then a convoy escorted by a frigate was sighted and four merchantmen were taken. These events had led the squadron far to leeward of Vigo. As the crews were in very bad condition due to the scurvy, it was now necessary for Allemand to get into a friendly port as soon as possible. He heard that Strachan with 10 of the line was waiting for him off Vigo, and as it would take him a long time to beat up against the wind to that port, he concluded that Vigo could not be reached. Cadiz was out of the question and he could not return to a French port because his orders required him to be out for six months. His only chance was to run for the Canaries. On October 11 he headed toward Teneriffe, where he arrived on November 4. The Spanish authorities gave him provisions and water and material to make his repairs. On the 19th he sailed for Cape St. Vincent, to raid the communications of the Cadiz blockading squadron. On the 23d he captured a merchantship and learned that a great battle had been fought off Cadiz. On December 19 he arrived off St. Vincent and learned of the great defeat suffered by Villeneuve. Now he stood to the northward and on December 24 ran safely into Rochefort. He had been absent for 161 days, of which 148 had been spent under way. He had brought all his ships back without injury and had inflicted moderate damage on the English commerce.

You might well consider this cruise a pattern for all operations against commerce which are carried on without the command of the seas. It would be impossible to praise too highly the skilful manner in which the French commodore mixed audacity with caution. Still we see that even when conducted with this skill the cruise had accomplished no result of importance. It is true that Allemand might with a little more luck have destroyed Baird's military convoy or some of the great trade convoys which he missed so narrowly. But, you must remember that, on the other hand, Allemand had seven or eight almost miraculous escapes from capture, so the luck must be called about equally divided.

Why was it then that this bold and skilful officer was unable to accomplish more? The great reason, in my opinion, was that a raiding squadron must avoid all fighting unless it has such great



POSITIONS, SEPTEMBER 15.

West Indies ..... ● 10A
India ..... ● 8A ■ 1

superiority as to be able to win without suffering any appreciable losses itself. Even an inferior hostile squadron, while itself beaten, may be able to cripple some ships of the raiding force. Under these conditions a crippled ship is as good as lost, as it must depend upon its speed to escape, and as it has no facilities for repairing its damage. Therefore, as a raiding squadron cannot fight, it must be constantly on the lookout for hostile squadrons, and must be constantly changing its position so as to avoid them. It is reduced to a strict defensive, and this has its inevitable effect upon the morale of the officers and crews of the squadron. It is impossible to accomplish anything without being willing to fight, unless you have some certain method of escape. If you have very superior speed, or a safe base near at hand, it will not be necessary to give all your attention to evading the hostile squadrons, and better results can be obtained. Allemand had none of these advantages, and thus was kept so busy avoiding the numerous squadrons all around him that he had no time to gain any great result in commerce destruction. War directed against commerce cannot have a great effect when it is impossible to command the seas, unless the raiding ships have some special way in which they may certainly escape. Such a war against commerce has never gained the decision in itself, although when combined with other operations it may play a part of certain importance.

3. Protection of the Trade Routes

When Calder had been detached with 23 units to Ferrol, Cornwallis with an equivalent force remained off Brest. While it had been necessary to divide the Brest squadron into two equal sections for the important reasons we have discussed before, it was also very important that these two sections be handled as nearly as possible as one body. Both divisions must be kept at all times between the two great hostile squadrons in Ferrol and Brest, so that both could be united for a blow in either direction. Suppose, for example, that Calder had met Villeneuve heading toward the Channel with a force he considered himself unable to face. Then it would be his best course to retire slowly before it, avoiding action by means of the greater efficiency in maneuvering and seamanship which the English squadron had. While the retirement was taking place, the information as to Villeneuve's advance would be forwarded to Cornwallis. The latter would raise the

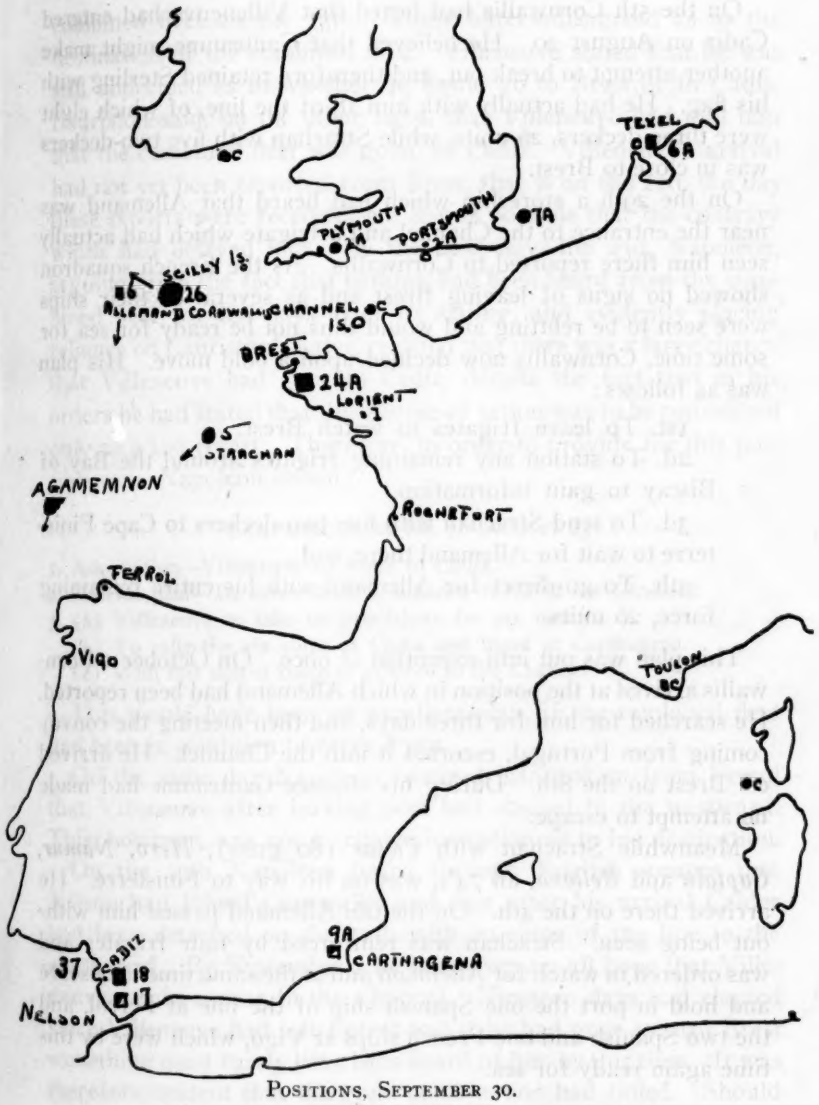
blockade of Brest, run to join Calder and with the united squadrons destroy Villeneuve, who would be unable to escape due to the inferior seamanship of his squadron. Then, Villeneuve defeated, Calder would follow him up with a small force, while Cornwallis would return to Brest, or, if the frigates off Brest had reported that Ganteaume had gone into the Channel, in that direction. In order to carry out such a plan, which required the close cooperation of two sections of the fleet, it was necessary for both Calder and Cornwallis to gain accurate and early information of the movements of the combined fleet and Brest squadron, and also for each admiral to inform the other of the movements of his own squadron. We have seen the great importance Cornwallis attached to this system of intercommunication in his order to Calder. He had already sent three frigates, *Naiad, Iris* and *Nimble,* toward Ferrol, where there were already two ships of the line, *Goliath* and *Dragon.* With Calder he had sent one frigate, *Sirius,* and one gunboat, *Attack.*

On the 19th, three days after Calder had left, *Naiad,* having spoken Calder, reached Cornwallis. He learned for the first time that Villeneuve had sailed from Ferrol to the westward. He at once sent back *Naiad* with another frigate, *Hazard,* with orders for Calder to go in pursuit of the combined fleet.

On the 20th Cornwallis received information from Barham that a large East India convoy was expected soon. He was ordered to take measures to protect it, if it seemed to be the objective of the enemy. The dispatch of Calder in pursuit of the combined fleet, in which he expected Allemand to be incorporated, was the most effective move he could have made to protect the convoy, and as he could not reduce his force by sending out further detachments at this critical point of the campaign, he paid no further attention to the order. It was well for him that he did not, for the next day, the 21st, Ganteaume came out of Brest and anchored in the fortified anchorage of Bartheaume outside the harbor. Cornwallis could not let him stay there, because, if Villeneuve were to appear, Ganteaume might be able to take part in the battle. Therefore on the next day, the 22d, Cornwallis stood in to attack. Ganteaume ran into Brest, and Cornwallis was forced to retire from under the heavy fire of the shore batteries. His object had been gained, as now there was no possibility that Ganteaume and Villeneuve could concentrate on the field of battle.

On September 1 Cornwallis received word from the frigate *Melampus* that Allemand on August 30 had been about 70 miles south of Brest. At this time Baird's expedition with an enormous convoy for the West and East Indies was about to sail. The East Indies convoy was valued at over $75,000,000 and the West Indies convoy was composed of over 200 ships. Also the Lisbon-Oporto convoy was about to leave the Channel. The situation was critical. On the one hand, it was necessary for Cornwallis to keep concentrated for Villeneuve's possible appearance. On the other hand, it was necessary for him to disperse his force so as to drive off Allemand. He had received an order from Barham to detach four or five of the line as soon as he would have sufficient ships to leave 18 of the line off Brest after the detachment. But now he had only 18 ships. He finally decided that the danger to commerce was greater than that which might be expected from Villeneuve and Ganteaume. On September 1 he sent Rear Admiral Sterling with one three-decker and four two-deckers—just Allemand's force—to bring the French squadron to action. Barham had originally ordered him to send the detachment to a position 300 miles westsouthwest of the Scilly Islands, but as Allemand had been seen off the French coast, it would be foolish to send Sterling to the position ordered by the Admiralty, which would take him in an entirely different direction. Cornwallis therefore ordered Sterling to look into Lorient and Rochefort, and if Allemand was not there to go to the northward "to protect the homeward-bound convoys and see them into the Channel."

Accordingly on September 1 Sterling left with *Glory, Repulse Triumph, Dragon* (which had not joined Calder), *Warrior*, and the frigate *Crescent*. He saw the next day that Allemand was not in Lorient, but was held up by bad weather on his way to Rochefort. It was not until the 10th that he heard from a neutral ship that Allemand was not in Rochefort. Up to the 6th Allemand had been but 60 miles to the west of him. On the 10th Sterling headed toward the entrance of the Channel, reaching a position about 80 miles westsouthwest of the Scilly Islands by the 17th. On the 19th he sighted Nelson with three of the line on his way to Cadiz, and from them received word that the East India convoy had arrived safely. He therefore returned to Cornwallis, joining the flag on the 20th. It is curious to note that on the very day he left his station, Allemand had taken up a position only 100 miles to the westward of him.



POSITIONS, SEPTEMBER 30.

West Indies ..... ● 10A
En Route England to Madeira..... ● 2
India ..... ■ 1 ● 8A

Baird's Convoy.

On the 5th Cornwallis had heard that Villeneuve had entered Cadiz on August 20. He believed that Ganteaume might make another attempt to break out, and therefore retained Sterling with his flag. He had actually with him 18 of the line, of which eight were three-deckers, 26 units, while Strachan with five two-deckers was in close to Brest.

On the 29th a storeship which had heard that Allemand was near the entrance to the Channel and a frigate which had actually seen him there reported to Cornwallis. As the French squadron showed no signs of leaving Brest and as several of their ships were seen to be refitting and would thus not be ready for sea for some time, Cornwallis now decided upon a bold move. His plan was as follows:

1st. To leave frigates to watch Brest.

2d. To station any remaining frigates around the Bay of Biscay to gain information.

3d. To send Strachan with five two-deckers to Cape Finisterre to wait for Allemand there, and

4th. To go direct for Allemand with his entire remaining force, 26 units.

This plan was put into execution at once. On October 1 Cornwallis arrived at the position in which Allemand had been reported. He searched for him for three days, and then meeting the convoy coming from Portugal, escorted it into the Channel. He arrived off Brest on the 8th. During his absence Ganteaume had made no attempt to escape.

Meanwhile Strachan with *Cæsar* (80 guns), *Hero, Namur, Captain* and *Bellona,* all 74's, was on his way to Finisterre. He arrived there on the 4th. On the 6th Allemand passed him without being seen. Strachan was reinforced by four frigates and was ordered to watch for Allemand and at the same time to observe and hold in port the one Spanish ship of the line at Ferrol, and the two Spanish and one French ships at Vigo, which were by this time again ready for sea.

NINTH LETTER

1. NAPOLEON AT BOULOGNE

On August 22 Napoleon at Boulogne received reports from Villeneuve and Lauriston, who commanded the troops embarked on the combined fleet, in which was announced the sailing of the

combined fleet on the 13th. These letters disagreed as to the destination of the combined fleet. Villeneuve stated that he was still undecided as to whether he would go to Brest or to Cadiz. Lauriston said, on the other hand, that Villeneuve had told him that the combined fleet was going to Cadiz. Villeneuve's arrival had not yet been reported from Brest, that is on the 22d, the day these reports were received, but it was possible that the contrary winds had delayed him. By the next day, the 23d, Napoleon, arguing from the fact that nothing had been heard from the combined fleet for ten days after its sailing, and evidently placing reliance on Lauriston's letter, realized that there was a large chance that Villeneuve had gone to Cadiz, despite the fact that in his orders he had stated that this course of action was to be considered only as a last resort. Therefore, in order to provide for this possible case, Napoleon issued:

CAMPAIGN ORDER NO. 7. AUGUST 23

1. Assumption—Villeneuve en route to Cadiz.
2. General plan—To concentrate a superior force in the Channel.
3. (a) Villeneuve to take on provisions for six months.
   (b) To rally the six ships at Cadiz and those at Carthagena.
   (c) With this united force to proceed to the Channel.

This would have been an excellent plan, if the combined fleet had been in condition to carry it out.

On the same day Napoleon received information from Ferrol that Villeneuve after leaving port had steered to the westward. This, however, was not a reliable indication as to his destination.

On the 29th Napoleon heard through English sources that Nelson had joined Cornwallis and that after his arrival Calder had been detached on the 17th with 20 ships of the line to the southward. By September 1 he had given up all hope that Villeneuve would appear in the Channel. Nineteen days had elapsed since Villeneuve had left Ferrol and if he had gone toward Brest something must surely have been heard of him by this time. It was therefore evident that the great combination had failed. Should he continue in his attempt to invade England or should he definitely give it over? Let us see from his point of view what the political situation was, for policy had to be considered in the great game he was playing, and his strategy had to correspond with the political situation.

First. What military forces had he available? The combined fleet was at Cadiz, about 35 units strong. It would require some time to get on provisions and repair damages. Its recent operations had proved its inefficiency, and its failure would still further discourage its personnel. It was evident that this fleet could not be expected to gain the command of the English Channel, and therefore that the invasion must be a failure. The grand army was still at Boulogne and in Holland and was ready for a move against either England or Austria. Thus, while the navy was inefficient and he could expect to gain nothing on the sea, the army was the best in Europe and was in an excellent position to commence operations on the continent.

Second. What forces could be brought against him? England was the only nation at war with him. On the sea the English had proved their strength and had parried the blow Napoleon had aimed at them. England was now in a position to change from the defensive to the offensive. Craig was at Malta with 8000 troops. The strength of this force could not be measured by its numbers, because it had the great advantage of being able to strike at any point in the Mediterranean. Baird had sailed from Ireland with a large force for some unknown destination. There were, in addition to these forces, about 40,000 regular troops in England which could be quickly transported to some unknown point in northern Europe. Thus England was in a threatening position. But England alone could not accomplish any lasting result on the continent. She must have allies. The worst of it was that these allies were at hand, for all Europe was on the very point of rising against France.

It was common knowledge that Russia had either signed or was about to sign an offensive alliance with England. The Russian general Lacy was at Corfu discussing courses of action for the use of the combined English and Russian forces in Italy. Russia was about to reinforce Austria with about 100,000 troops, paid with English gold. Austria had placed her army on a war footing and was sparring for time. Prussia and Sweden seemed wavering between peace and war, while of course Naples and Portugal were, as they always have been, under the thumb of England. Thus France was threatened by practically every power in Europe. English policy had succeeded in forming a great coalition against Napoleon, or rather, was just on the point of succeeding.

The great crisis had arrived. It was impossible for Napoleon to wait longer. It was imperative for him to strike and strike quickly, as every day would add to the strength of his enemies, and now the failure of the combined fleet would further encourage them. There was no time for the combined fleet to get back into the Channel. A great success was needed to break up the coalition. Austria was the nearest nation to strike and the easiest to defeat, and now Napoleon decided to definitely give up the invasion project and to strike Austria with his entire force.

Therefore, on the 1st of September he gave the order to disarm the flotilla. Only a few hours after this decision was made, there arrived, by a very curious coincidence, the news that on August 21 the combined fleet had entered Cadiz. At the same time word was received from Allemand that he had entered Vigo and had left on August 16 for the rendezvous near Brest. This was bad business and called forth some harsh criticism of Villeneuve. Napoleon was further exasperated by the news that Villeneuve had seen the *Didon* and had made no attempt to recapture her, and by the fact that Collingwood had escaped so easily at Cadiz.

As soon as this news had been received, Decres sent off temporary orders for Villeneuve. He was:

1st. To take on provision for six months.

2d. Attack an enemy trade convoy that was heard to be on its way to the Mediterranean.

3d. To draw in the Carthagena squadron, and

4th. Not to allow himself to be blockaded by an inferior force.

These were certainly good orders.

Now that the Emperor had made his major decision to attack Austria, he busied himself with the actual plans of campaign. He first went over the dispositions of the Austrian forces. The main Austrian army was concentrating in northern Italy and was to be commanded by the celebrated Archduke Charles. The Russians from Corfu and the English in Malta would attack southern Italy. In Bavaria, an Austrian force under Mack was advanced well toward the Rhine. This force was only about 50,000 strong. Large Russian forces were coming up, but they would not be available for the first operations. Bavaria was the weak spot in the Austrian line.

Not only was it the weakest, but it was also the most important. A French advance through Bavaria on Vienna, would force the Austrians to retreat from northern Italy. This retreat in northern Italy would force a retirement in southern Italy. Bavaria was the keypoint. It was here that Napoleon would strike and with overwhelming numbers. But while attacking here, he could not neglect altogether the less important points. He must hold them with small forces acting on the defensive. Thus Massena was placed in northern Italy against Archduke Charles and St. Cyr was to hold southern Italy as long as possible. As these generals on the right flank had very weak forces, it was necessary to strengthen this flank in every way. As southern Italy could be attacked only over the sea, as long as Massena held his ground in the north, the greatest reinforcement St. Cyr could have would be the combined fleet, which by basing on Naples could definitely prevent the landing of the English and Russians in southern Italy.

Therefore on September 16 Napoleon sent orders to Villeneuve at Cadiz. They contained the following stipulations:

CAMPAIGN ORDER NO. 8. SEPTEMBER 16

1. Assumption—Craig and Lacy about to invade southern Italy.
2. General Plan—To prevent a landing of English and Russian troops in southern Italy.
3. (a) The combined fleet to take on provisions for two months.
   (b) To sail into the Mediterranean at the first favorable opportunity.
   (c) To pick up the Carthagena squadron.
   (d) To proceed to Naples.
      1. To land the troops embarked on the fleet.
      2. To do the utmost harm to the enemy.
      3. To intercept Craig's expedition should it leave Malta.
   (e) To attack any inferior force of the enemy wherever met.

As Napoleon did not believe Villeneuve capable of carrying out these orders, he sent, on the 17th, Admiral Rosily to relieve him of the command.

This order no doubt surprises you. It certainly seems different from all of Napoleon's previous orders, except the one to Ganteaume to go out to fight Cornwallis which he issued on July 20. It seems to have excited derision among the English naval critics, as Napoleon is accused by every one of them of practically throwing his fleet away.

POSITIONS - 15 SEPTEMBER
BRITISH SHIPS - UNITS
BRITISH TROOPS - THOUSANDS
SWEDISH " "
RUSSIAN " "
AUSTRIAN " "
FRENCH SHIPS - UNITS
SPANISH " "
FRENCH TROOPS - THOUSANDS
HAMBURG
BERLIN
DRESDEN
ELBE
WARSAW
LEMBERG
VIENNA
DANUBE
CORFU
WESER
RHINE
ULM
MUNICH
STRASBOURG
ALPS
PO
GENOA
ROME
NAPLES
SICILY
MALTA
TUNIS
CORSICA
SARDINIA
TOULON
PARIS
LONDON
NELSON
ROCHEFORT
BREST
CARNWALLIS
STERLING
FERROL
MADRID
CARTHAGENA
VIGO
LISBON
CADIZ
GIBRALTER
ALLEMANDE

Let us, however, examine the principles under which Napoleon had been acting from our own point of view and see if he can show that this action was perfectly consistent with his previous plans.

Up to this time Napoleon had been applying his principle of avoiding action until he had concentrated the entire French and Spanish navies into one body; that is, until he could unite Villeneuve with Ganteaume. This was in perfect accord with his repeated statements in regard to concentrating every battalion for the decisive battle, and, in my opinion, was sound strategy. At Brest the English held the interior position between the two French squadrons at Brest and Ferrol. It was thus very probable that the English could bring superior fighting strength, if not superior numbers, against either one of the French squadrons which might advance, especially as the English, with their very superior seamanship, which in those days was equivalent to what superior speed is to-day, could either accept or avoid action exactly as they pleased. Thus Napoleon was wise in avoiding, as far as he could, an action in which he was almost certain to have inferior fighting strength, as long as there was a chance for Villeneuve and Ganteaume to unite without fighting. This system of evasion, however, had not succeeded and now there was no prospect of Villeneuve being able to unite with Ganteaume. In addition to this the situation had changed, and to Napoleon's advantage. When Villeneuve had been at Ferrol, both Villeneuve and Ganteaume, and both Calder and Cornwallis might be considered in one theater of operations. In this theater the English held the interior position, so that they might throw the whole of their combined force against either Villeneuve or Ganteaume. Now, with Villeneuve at Cadiz, there were two distinct theaters of operations. Cornwallis was opposed to Ganteaume and Collingwood to Villeneuve, and while the English might still be said to hold the interior position, this was of little advantage because neither English squadron could assist the other in battle. Thus Villeneuve would not have to consider anything but the English squadron directly in front of him; he could neglect altogether the menace of the Brest squadron, something he could not have done at Ferrol. In the new situation Villeneuve would in all probability have superior numbers, if he could call in the Carthagena squadron, or if it could be made to do something to draw some of the

English force away from Cadiz. But while Villeneuve would probably have superior numbers, it was almost certain that, considering the greater efficiency of the English, he would have inferior fighting power. Thus in an action the chances would be against him. The Emperor must have realized this. We saw that in his original plan of operations the chances of success were against Napoleon, but we were forced to admit that, despite this, the plan was probably the best which, under the actual conditions, could have been devised. Now again we see that in the new plan the chances of success were not in his favor, but was not the new plan the best he could use? There are two alternate plans which you suggest. First, you say that he might have retained his fleet in port for the present in the hope that by some fortunate chance Ganteaume might be able to join Villeneuve or that the enemy might give Villeneuve some favorable opportunity to escape. It is true that there was some small chance of Ganteaume's joining Villeneuve or of Villeneuve's escaping from Cadiz in the bad weather of the autumn season, but the vital defect of this plan was that it meant delay. The longer the French and Spanish ships remained in Cadiz in idleness, the more inefficient they would become. Spain might at any time break off the Alliance, as she did three years later. England was very rapidly building ships and would soon have greatly superior numbers. Thus delay would weaken Napoleon and assist England. Also, the combined fleet would be of no assistance to the land forces at a critical point. The second possible plan was for the combined fleet to be split up into several divisions to raid commerce after the Allemand fashion. It is very doubtful whether the Spanish ships could have been used in this way and only about half the French ships were in proper material condition for such arduous service. While this plan might have caused the English considerable damage if it could have been properly carried out, it is very doubtful whether there were any French commanders who would have shown the skill and had the luck of Allemand. The results of the cruise of the divisions of the Brest squadron give us an indication as to what the result would have been. Such operations would have had no effect upon the land campaign, which for the time was of far greater importance than the war on the sea. Napoleon considered this second plan very carefully, but finally decided in favor of fighting. I think that you will now admit that Napoleon's plan was probably

the best which could have been used, even though the chances of success were not very great.

At the same time when Napoleon sent these orders to Villeneuve, he decided to use the greater part of the Brest squadron for commerce raids, as it would have little chance of beating Cornwallis. These raiding divisions were not to leave until after Villeneuve had left Cadiz, as this might allow the blockading force off Cadiz to be reinforced.

As to the combined fleet, if its operations in the Mediterranean were successful, it was to be brought to Toulon. There it was to be reinforced by the ships being built there and at Genoa. If it were not able to get away from Cadiz, it was to be broken up into raiding divisions to leave during the bad weather of the autumn season. Orders to carry into effect these plans were issued on September 23. On that day Napoleon left Paris to commence the campaign against Austria.

2. Villeneuve at Cadiz

The combined fleet arrived at Cadiz on August 20 in a terrible condition. Provisions were lacking, the spars and rigging of many ships needed repairs, and there were nearly 2000 sick, although over this number of sick had been landed at Vigo and Ferrol. The Spanish ships which were to have joined at Cadiz were not ready for sea. It was evident that nothing could be done until conditions were bettered and Villeneuve and Gravina set to work to do what could be done.

As the troops embarked on the ships were in a terrible condition they were camped on shore. The crews set to work to make the repairs as best they might with the insufficient facilities of the arsenal. Great difficulty was experienced in getting provisions, as there was a financial crisis at Madrid and the French commissary officer could not get the necessary money. Even though Gravina gave Villeneuve some supplies belonging to the Spanish ships, it was not until September 16, a period of nearly a month, that there were enough supplies to last a month and a half.

As you will remember, 11 Spanish ships left Ferrol, of which one was a three-decker. They were to be joined at Cadiz by six new Spanish ships. However, two of the 11 ships, *Terrible* (74 guns) and *San Fulgencio* (74 guns) could not be used further

on account of their poor material condition. Of the six ships to be ready at Cadiz only *Santa Trinidad* (140 guns), the largest ship then afloat, and *Bahama* (74 guns) were fit for service. Thus, upon arrival at Cadiz there were only 11 Spanish ships ready, of which two were three-deckers. By September 16 *San Justo* (74 guns) was ready. On the 28th *Rayo* (100 guns) and *San Leaddro* (64 guns) joined the fleet. The last ship, *Santa Anna* (110 guns) was not ready until October 7. The combined fleet increased in strength as follows:

August 20	31 units.
September 16	32 units.
September 28	35 units.
October 7	37 units.

Of this number many French ships were in very poor condition.

On September 28 Napoleon's orders of September 16 arrived at Cadiz. Gravina at once reported to Villeneuve that 14 Spanish ships were ready for sea. Villeneuve decided to leave as soon as possible, fully expecting to fight the day he sailed. The order was actually given to embark the troops. A stirring proclamation was issued. If it had been possible to sail immediately, there would have been a good chance of success. But to sail at once was impossible. The troops had to be embarked and the wind had to be favorable. This delay killed Villeneuve's chances, because on the evening of the 28th news came in that three more English ships had arrived and on the 2d of October information was received from Madrid that this reinforcement consisted of four of the line and that Nelson had arrived to command in chief with great plans to attack the combined fleet inside the harbor. Villeneuve and Gravina were greatly affected by this news, and far from thinking of going out, began to organize a flotilla of small boats for the defence of the harbor, manned by the personnel of the fleet. There is no better example than this in all history of the effect of the personality of a single man upon the enemy.

Still Villeneuve hoisted the signal to get under way on the 7th of October, but influenced by the protests of his subordinates and "the observations which came from all sides on the inferiority of our forces," he gave up the movement and upon the request of Gravina called a council of war.

At this time, October 8, it was believed that the English fleet consisted of from 31 to 33 ships of the line, of which eight were

three-deckers. This would give them from 39 to 41 units as against the 37 of the combined fleet. Under these conditions, success was practically impossible. I said before that Villeneuve would be superior in numbers if the Carthagena squadron could join him or could draw off from Cadiz an equal number of English ships. But the Carthagena squadron had done nothing and now Villeneuve was inferior in numbers, not to consider fighting strength. Therefore after some discussion, in the course of which Rear Admiral Magon made some foolish and insulting remarks about the Spanish officers, the council gave the following decision:

> That it is necessary to wait for a favorable opportunity, as is stated in the instructions of the admiral, and which can be brought about by bad weather which will drive the enemy from these shores, or by the necessity of dividing the forces of his squadron to protect his commerce in the Mediterranean and the convoys which may be menaced by the squadrons at Carthagena and Toulon.

In considering this decision we must note two points in Villeneuve's orders. First, he was to wait for a favorable opportunity of leaving Cadiz. What was meant by a favorable opportunity? Would he have a favorable opportunity for leaving Cadiz when he must certainly fight an enemy very superior to him? Second, the Emperor had ordered him to fight every inferior force he met. While this did not necessarily mean that he was not to fight a superior force, it might with reason be interpreted in this way.

I do not wish to go on record as favoring councils of war, and I cannot approve the insubordinate behavior of the officers of the combined fleet; still I have to admit that this decision is, in my opinion, not the disobedience of orders it has usually been held to be, but rather a very intelligent obedience of orders. It would appear very proper for the combined fleet to wait a reasonable time until the activities of the Carthagena squadron could draw off some of the English ships into the Mediterranean, or until the enemy would be forced to detach some of his ships for other reasons. As it happened, the actual events justified the decision. It was partly the threat of the Carthagena squadron and partly the necessity for renewing the supplies of his own ships which forced Nelson to weaken his squadron by an entire division.

On October 18 news to this effect arrived. A convoy, escorted by four English ships of the line, had entered the Mediterranean. Another ship of the line was at Gibraltar disabled and still another was entering the port. This meant a reduction of Nelson's force of six of the line. Here then was the favorable opportunity. As an additional spur to action Villeneuve heard that Admiral Rosily had arrived at Madrid. Rumor said that this officer was to relieve him of the command. He immediately decided to put to sea. Early the next morning, the 19th, the combined fleet commenced to get under way. First the cruisers left and at 10 a. m. the first ships of the line went out.

3. NELSON AT TRAFALGAR

You will remember that on August 30 Calder joined Collingwood with 18 of the line off Cadiz. This gave the latter, as senior officer, 26 ships, of which seven were three-deckers, 33 units in all. You will also remember that at this time the combined fleet had but 31 units ready for sea, but Collingwood did not know this, as he could see about 35 ships in the harbor.

Collingwood disposed the squadron after the fashion of the "close blockade" as it was used off Brest, where he had been recently stationed. Admiral Louis with one three-decker and four two-deckers with a few cruisers was stationed about five or ten miles off the port, acting the rôle of an inshore squadron. The main body was about 20 miles off the port.

On the evening of September 28 Nelson arrived with *Victory* (100 guns), *Ajax* (74 guns) and *Thunderer* (74 guns), thus bringing the squadron up to 29 of the line, with eight three-deckers, or 37 units. At this time Villeneuve had but 35 units.

Nelson, while blockading a port, never tried to keep the enemy in, as Cornwallis and Gardner with the close blockade tried to do. He preferred to give the enemy every opportunity of coming out, so that he could meet him at sea and force a decision. This plan, the "open blockade," as it is called, had its disadvantages, as we have seen from our consideration of the two sorties of Villeneuve from Toulon, and Nelson for these reasons could not well put his usual plan into effect in this case, because he could give Villeneuve no chances of escaping. If he could escape and headed toward the Channel, the situation would be very dangerous. He therefore designed a plan which combined the features of both

forms of the blockade. As actually put into effect this plan was as follows:

1st. The main body was to be about 50 miles west of Cadiz, beating up toward the port when the winds were easterly.

2d. Captain Blackwood with five cruisers was to maintain a position close up to the port.

3d. Captain Duff with four fast 74's was to maintain the communications between these two bodies, but was to keep out of sight of land at all times.

In accordance with this plan Louis was withdrawn from in front of the port and the above dispositions were taken during the first days of October.

In order not to discourage the enemy's coming out, Nelson tried to conceal the news of his arrival. He did not succeed in this, as Villeneuve heard of it on October 2.

If the enemy would not come out of his own accord, he must be forced out. To do this Colonel Congreve's rockets, a new invention, were to be tried out. Also, the commercial blockade, commenced by Collingwood, was to be so perfected that the entry of provisions for the combined fleet would be entirely prevented.

The form of blockade used had one decided disadvantage which the open blockade did not have. In the latter form it was the custom to take up a position in some port or roadstead, fairly distant from the blockaded port, whenever it was necessary to take on provisions or water. In the present form of blockade, the main body would not be able to leave its position, and thus it would be necessary for a division of ships to be detached at a time to go to Gibraltar or Tetuan for renewing its supply of provisions and water. There were other reasons for keeping a division at the Straits. The Spanish squadron at Carthagena, despite the inefficiency with which it had been handled, was a menace to the English convoys passing through the Straits and to Craig's force on the island of Malta. It might also be able to pass through the Straits and join Villeneuve at Cadiz. For all these reasons Louis was sent to Gibraltar on October 2 with *Queen* (98 guns), *Canopus* (80 guns), *Spencer, Zealous* and *Tigre,* all 74's. He escorted a small convoy bound for Malta. Nelson did not consider Louis as detached from his force, because he planned to run down to the Straits and to pick him up as soon as Villeneuve should be reported as coming out.

The day after Louis left, Blackwood, who with the frigates had taken up his station close in to Cadiz, sent a sloop after him with the information that the French troops were embarking. Louis, on the receipt of this information, sent the convoy on with an escort of two of the line, and with the rest of his division went back to Nelson. Nelson did not believe that Villeneuve was coming out and accordingly sent Louis back to Gibraltar. On the 7th he arrived there and went to Tetuan. Here he took on water and provisions until the 15th. After Louis' departure the squadron consisted of 31 units.

On October 8 the *Royal Sovereign* (100 guns) arrived. She brought important dispatches. War was about to break out on the continent. Craig had orders to join the Russians in an attack on southern Italy. Nelson was ordered to protect Craig's communications and assist his expedition in every way. These orders convinced Nelson that Villeneuve would soon try to get into the Mediterranean. They also emphasized the necessity of keeping a division at the Straits to watch the Carthagena squadron, as of course Craig could not attempt anything while this squadron was at large.

On the 10th *Belle Isle* (74 guns) arrived, and about this time *Defiance* (74 guns). The addition of these two ships brought Nelson's strength up to 35 units, excluding Louis' squadron. On the 13th *Prince of Wales* (98 guns) left and the *Agememnon* (64 guns) arrived. On the 14th *Africa* (64 guns) came in and on the 16th *Denegal* (74 guns) went to Gibraltar for repairs. The result of all these changes was that 34 units remained with Nelson's flag.

At 7 a. m. on the 19th the inshore frigates signalled that the combined fleet was coming out of port. It was about 9.30 when Nelson received this report, in a position 55 miles due west of Cadiz. He immediately signalled for a general chase in the direction of the Straits. About 3 p. m. a signal was received to the effect that the enemy was all out of port.

In the meantime Blackwood had sent a sloop on to Louis with the information. Nelson held on for the Straits to meet Louis, as he wished to be as strong as possible for the action. Louis had completed taking on stores at Tetuan on the 15th. He set out to join Nelson, but was forced back to Tetuan on account of bad weather. There on the 17th he received orders from Nelson to

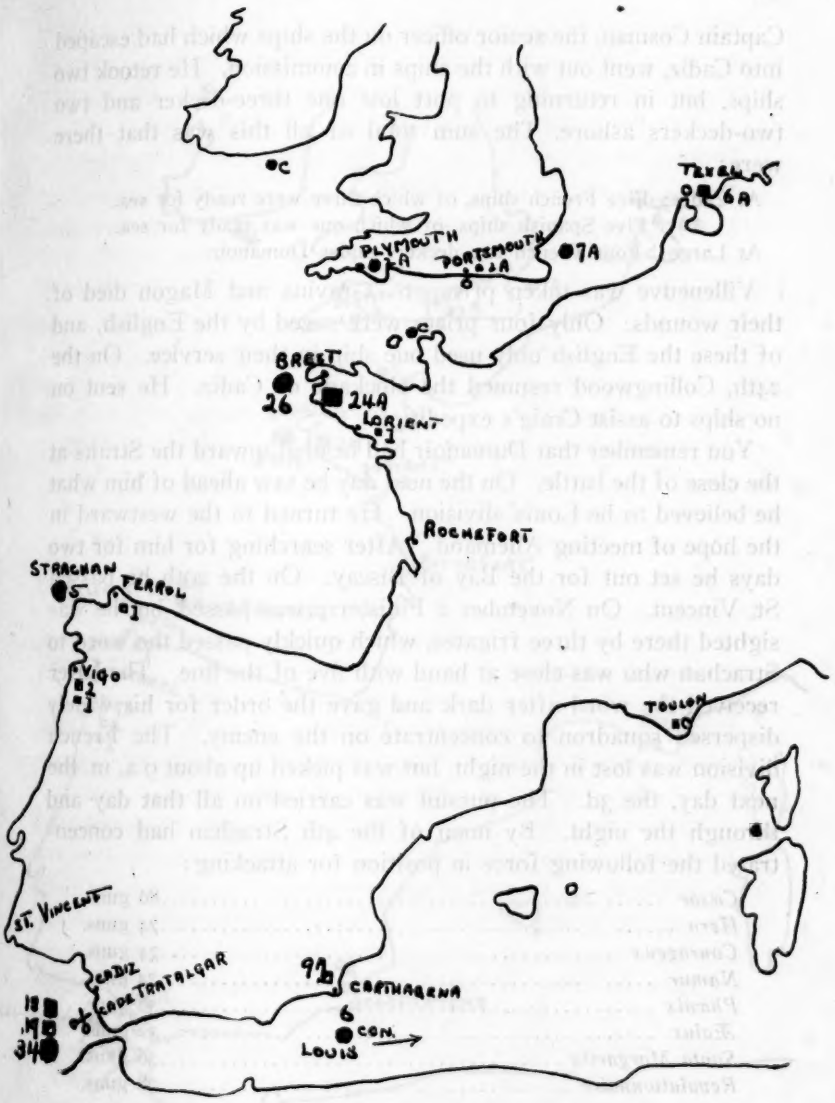
escort the Malta convoy past Carthagena. He set out into the Mediterranean at once. On the 21st he left the convoy and went in to blockade the Carthagena squadron until the convoy would be well clear. Thus the Carthagena squadron, by merely acting as a threat, was able to account for six units of the enemy on the day of the decisive battle.

At 1 a. m. on the 20th Nelson reached a position at the western entrance to the Straits and there he waited until the morning in the hope that he might see Louis. At daylight the combined fleet was nowhere to be seen, but by 8 a. m. Blackwood signalled in that it was due north of the English main body. Nelson decided not to force the action that day as he would not be able to get into range until late in the afternoon and as Villeneuve was so close to Cadiz that he might be able to get into port without fighting. Therefore he headed to the northwest until 2 p. m., when a sudden change of the wind threw his formation into disorder. By 4 p. m. the line had been formed again and the course was set to the southwest. Soon it was changed again to north, directly toward the combined fleet. At 8 p. m., all of Captain Duff's advanced squadron having joined the line, the course was made southwest. Blackwood with the cruisers kept touch with the enemy during the night.

On the next morning, the 21st, the combined fleet was in plain sight to the northeastward, distant about eight miles. Nelson decided upon battle and, forming his fleet into two very irregular parallel columns, advanced to the attack. Villeneuve formed in a long irregular crescent-shaped column and waited.

I will not attempt to decribe the famous battle which ensued, as that would be in the realm of tactics, with which we are not here concerned. The first shots were fired a little after noon and by a little after 1 p. m., the action had become general. It was contested with great bravery and skill on both sides, but finally, in part due to the failure of the French van to get into action, resulted in a great and complete victory for the English. Twenty ships of the combined fleet were taken or sunk, nine escaped into Cadiz, and four under Rear Admiral Dumanoir ran off in the direction of the Straits. About half the English ships were in condition for further fighting at the end of the battle. Nelson was killed and Collingwood assumed the command.

Immediately after the action ended a gale came up. A number of prizes were destroyed; others were seized by their prize crews.



POSITIONS, OCTOBER 21.

West Indies	●	10A
India	■ 1 ●	8A
En Route Madeira to Good Hope	●	2
Baird's Convoy.		
En Route St. Vincent to Teneriffe	■	6
Allemand		

Captain Cosmao, the senior officer on the ships which had escaped into Cadiz, went out with the ships in commission. He retook two ships, but in returning to port lost one three-decker and two two-deckers ashore. The sum total of all this was that there were:

At Cadiz: Five French ships, of which three were ready for sea.
Five Spanish ships, of which one was ready for sea.
At Large: Four French two-deckers under Dumanoir.

Villeneuve was taken prisoner. Gravina and Magon died of their wounds. Only four prizes were saved by the English, and of these the English only used one ship in their service. On the 24th, Collingwood resumed the blockade of Cadiz. He sent on no ships to assist Craig's expedition.

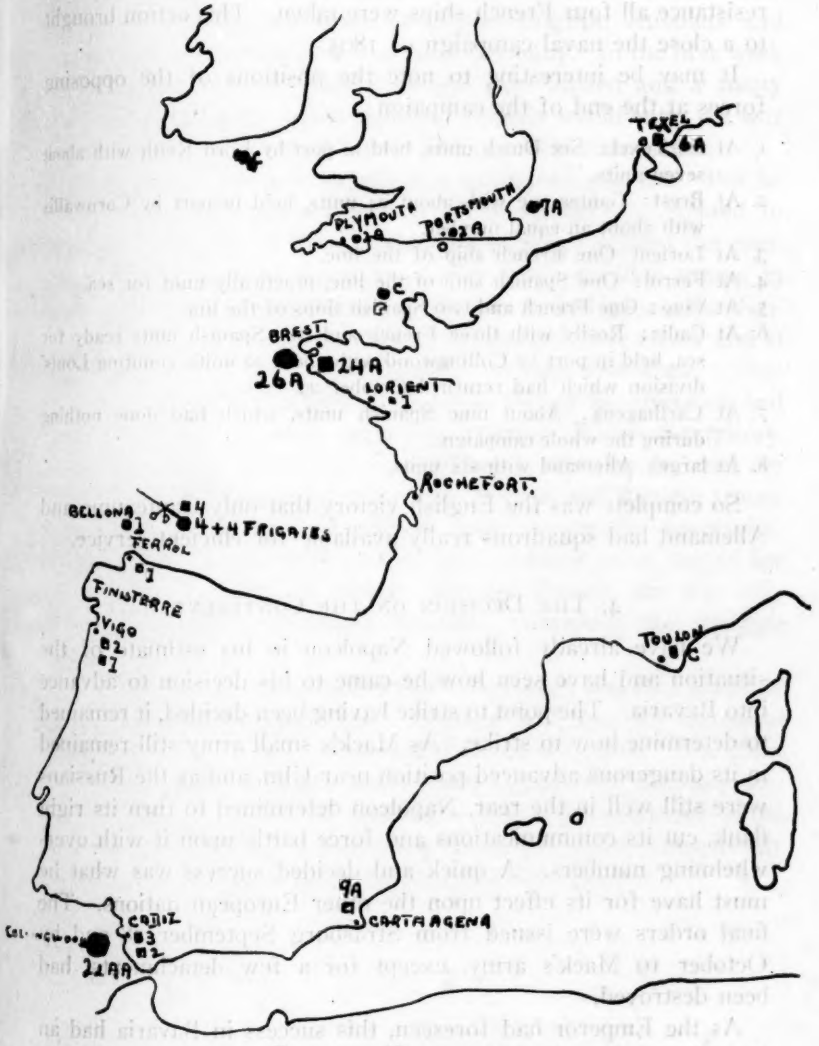
You remember that Dumanoir had headed toward the Straits at the close of the battle. On the next day he saw ahead of him what he believed to be Louis' division. He turned to the westward in the hope of meeting Allemand. After searching for him for two days he set out for the Bay of Biscay. On the 29th he passed St. Vincent. On November 2 Finisterre was passed, but he was sighted there by three frigates, which quickly passed the word to Strachan who was close at hand with five of the line. The latter received the word after dark and gave the order for his widely dispersed squadron to concentrate on the enemy. The French division was lost in the night, but was picked up about 9 a. m. the next day, the 3d. The pursuit was carried on all that day and through the night. By noon of the 4th Strachan had concentrated the following force in position for attacking:

Cæsar ..... 80 guns.
Hero ..... 74 guns.
Courageux ..... 74 guns.
Namur ..... 74 guns.
Phœnix ..... 36 guns.
Æolus ..... 32 guns.
Santa Margarita ..... 36 guns.
Revolutionnaire ..... 38 guns.

Dumanoir had:

Scipion ..... 74 guns.
Formidable (20 guns thrown overboard to keep from sinking) ..... 80 guns.
Duguay-Trouin ..... 74 guns.
Mont Blanc ..... 74 guns.

All these ships had suffered somewhat severely at Trafalgar.



POSITIONS, NOVEMBER 4.

West Indies		10AA
India	1	8A
Teneriffe		6

The English frigates attacked the rear of the French column and compelled Dumanoir to accept battle. After a splendid resistance all four French ships were taken. This action brought to a close the naval campaign of 1805.

It may be interesting to note the positions of the opposing forces at the end of the campaign:

1. At the Texel: Six Dutch units, held in port by Lord Keith with about seven units.
2. At Brest: Ganteaume with about 24 units, held in port by Cornwallis with about an equal number.
3. At Lorient: One French ship of the line.
4. At Ferrol: One Spanish ship of the line, practically unfit for sea.
5. At Vigo: One French and two Spanish ships of the line.
6. At Cadiz: Rosily with three French and two Spanish units ready for sea, held in port by Collingwood with about 22 units, counting Louis' division which had returned October 29.
7. At Carthagena: About nine Spanish units, which had done nothing during the whole campaign.
8. At large: Allemand with six units.

So complete was the English victory that only Ganteaume and Allemand had squadrons really available for efficient service.

4. The Decision on the Continent

We have already followed Napoleon in his estimate of the situation and have seen how he came to his decision to advance into Bavaria. The point to strike having been decided, it remained to determine how to strike. As Mack's small army still remained in its dangerous advanced position near Ulm, and as the Russians were still well in the rear, Napoleon determined to turn its right flank, cut its communications and force battle upon it with overwhelming numbers. A quick and decided success was what he must have for its effect upon the other European nations. The final orders were issued from Strasburg September 28 and by October 19 Mack's army, except for a few detachments, had been destroyed.

As the Emperor had foreseen, this success in Bavaria had an immediate effect in Italy. Archduke Charles, although he had beaten Massena, was forced to retreat in haste toward Vienna, as soon as he heard of the disaster at Ulm. Craig and Lacy with a combined force of some 20,000 men landed on November 20 at Naples only to hear of the Archduke's retreat. After this they remained on the defensive.

While the success at Ulm had a great effect in Italy, it did not have an equal effect in Germany. To assist Prussia and to force her hand a combined force of 70,000 English, Russians and Swedes were to assemble in northern Germany. In the first week of November 11,000 English troops were landed and a treaty was signed at Berlin which said that Prussia would enter the war unless Napoleon accepted her mediation within four weeks.

Napoleon was therefore still in a dangerous position. But he boldly advanced, entered Vienna on November 13, crossed to the northern bank of the Danube, and marched against the combined Austrians and Russians. Using every possible means in politics to delay Prussia's blow until after he had gained the decision over his immediate opponents, he awaited their attack and at Austerlitz won a great and complete victory over them. This was the end of the coalition. Austria signed an armistice and sued for peace. Russia agreed to evacuate Austrian territory. Lacy left Naples and Craig soon followed. Prussia declared her intention of remaining neutral. The English and Russian troops evacuated Germany. Napoleon was completely successful. Russia, alone, of all continental nations, refused peace, but as her troops were nowhere in contact with the French, she was only formally at war. England, however, continued the struggle alone.

Thus the great result of the year's campaign was that England and France were deadlocked. England had won the command of the sea and France the command of the continent. The great war continued for eight more years before the decision was finally won. England had been able to retain her command of the sea. Napoleon, with all his genius, had failed in the incomparably greater task of retaining the command of the continent.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A DIARY ON THE BLOCKADE IN 1863

By CHARLES A. POST

While engaged in destroying some old papers I came upon a diary, kept by me, upon the blockade off Wilmington in 1863.

With the diary was an old bundle of yellow letters, religiously preserved by my mother, and endorsed "Charlie's letters from the blockade, 1863."

It was a very crude and boyish record. I was 19 years old at the time, and neither the diary nor the letters were of much value either as literary or historical papers, but as a record of what applied science has done for the navy, in the lifetime of one living man, I found them interesting. They carried me back 54 years; and a half-century melted away as I was reading. What a half a century it has been! My ship, the *Florida,* was supposed to be a well-appointed vessel, but when I think of what she would have been to-day, her equipment seems almost medieval in its simplicity, and to bear about the same relation to a modern war-ship that a bow and arrow does to a rapid-fire gun. To begin with, we were a side-wheeler, with an exposed steam drum on deck, protected by a light screen of coal bunkers. The screw steamer, or propeller, as it was then called, was not unknown, and was the equipment of the up-to-date war vessels of the day, but the side-wheeler still held its own and had many earnest advocates. Our armament, which was heavy for a vessel of our size, 1200 tons, consisted of muzzle-loading guns, with an effective range of *nearly two miles.* We were considered fast. We could do about 12 knots, under favorable circumstances. We had no search-light, nor was there any sort of a search-light in any of the United States fleets that I ever heard of at that date. There were no electrical appliances of any kind, not even an electric bell. If we except the "tin clads" of the Mississippi, and the *New Ironsides,* off Charleston, which latter was a dismal failure, there was nothing in the way of a protected vessel but a few hastily constructed

monitors. These craft were, of course, the germ of the modern war-ship, but for efficiency, either on the blockade or for the purpose of attacking forts, they were only popular with those who had little practical experience with them. We had, of course, no motor-boats in the fleet, not even a steam-launch. The telephone, wireless, the submarine and the aeroplane were not even within the range of the wildest fancy. We had no cold storage, and I do not remember any canned food. Observations were taken to test our compasses, but I cannot recall any deviation card, or mechanical adjustments to correct the effect of the iron guns which we carried. Our doctors, of course, knew nothing of X-rays. If you had proposed to photograph the stomach of a living patient the proponent would have been a certain candidate for the straight jacket. Bacteria and microbes did not worry them in the slightest degree, neither did the vermiform appendix; and they calmly slapped at mosquitoes in blissful ignorance as to whether they were Anopheles or Stegomyia fasciata. And yet somehow or other we did not all die. From this reminiscent point of view, the boy's crude journal and the yellow package of old letters interested me, and with the aid of the memories which they have evoked I have tried to edit and arrange them in proper sequence. Perhaps they may interest my grandchildren, who, in turn, are serving their country, under vastly changed surroundings.

When the diary opens I was 19 years old. I had served a campaign in Virginia with the Twenty-second Regiment, and returned to New York as Second Lieutenant of C Company, with the prospect of passing my senior year at Columbia University. But Mars had got the best of Mercury, and I flatly refused to return to the Academic Shades, which then consisted of a block of rather shabby brick buildings at 49th Street and Madison Avenue. My family, with more prudence than patriotism, insisted that I should so return and complete my college course. As a condition precedent to the discussion I appeared before the faculty and asked for an honorable discharge, having passed all of my examinations, which I obtained and which, neatly framed, is now looking benignantly upon me from the wall above my desk. I next applied for a commission in the regular service, in which praiseworthy endeavor I cannot say that I was greatly assisted by my elders. All was, however, going on smoothly when I was taken down with a relapse of what I suppose would now be called " enteric," a sort

of very low fever. Almost all returning soldiers had it, more or less. It did not generally put you off duty, but as the boys at the front used to say, you got along pretty well for about six months, and then one morning you woke up and found yourself dead. This attack hit me pretty hard, and for a time the family had the best of it. The doctors shook their heads and suggested a long period of diet and rest, with perhaps a sea voyage; and for a time a law office or counting house hung over me like a nightmare. One day, when I had somewhat recovered, I was visiting one of my cousins and bemoaning the dismal prospect when she said, "Why don't you ask Captain Bankhead to take you off with him? He is a friend of your father. He has just been wrecked in the *Monitor,* has a splendid new ship, and will sail in a few weeks." I at once applied to him, and he very kindly appointed me his clerk, with a stateroom in his cabin, to mess with him, and act as his personal aide. The doctors' mouths were shut; they had prescribed a sea voyage, and the family was forced to consent. The next day I had my appointment—my uniform was ordered. Of course, my photograph taken. I was once more in the service, and, as they say nowadays, "doing my bit" to save the country.

After Worden was wounded, in the fight with the *Merrimac,* Captain Bankhead had been placed in command of the *Monitor,* which foundered off Hatteras, while in tow of the *Rhode Island* on her way to Charleston, during the latter part of December, 1862. He had recently been given command of the *Florida,* a former Savannah liner, of about 1200 tons burden, which was being converted into a man-of-war at the Brooklyn navy yard and nearly ready to be placed in commission. This was about March 1st, 1863. She was a side-wheeler. She had an exposed steam drum in the deck-house just under the bridge, but she was very fast—under favorable circumstances she could do 12 knots! !—and she carried what we considered a very heavy armament, four 9-inch smooth-bore guns on her spar-deck, a 100-pound Parott in the waist, and a 50-pound Dahlgren on the top-gallant forecastle. The officers' quarters were magnificent. Our cabin was like that of a 74, with three staterooms, one for the captain and one for me, a spare room, a butler's pantry and a bath. Rather a change from the close, damp quarters of a monitor. When we visited her together the captain was delighted and

told me that he hoped for a roving commission—to chase the *Alabama*. We were easily satisfied in 1863.

On March 4th the diary begins. This date is mostly taken up with uninteresting notes of my various preparations for the voyage, as is also the 5th.

On the 6th received orders to have all of my things on board by the afternoon of the 7th.

On the 7th the ship went into commission.

On the 8th went on board ship with the captain, came home to dinner—I find an entry: Do not expect to get off for several days.

March 9th. Routed out by the captain at 3 a. m.—orders to sail at once. He was at the door in a carriage. Hurried on my clothes and joined him. Heavy sleet and snow. Went to the navy yard at Brooklyn. Hailed *Florida*. Gig came ashore. Rowed off to the monitor *Nantucket*, which it seems we are to tow to the South. The captain went aboard; the clerk stayed in the gig. It was probably warmer in the cabin of the *Nantucket* than it was outside in the sleet and snow, for the old man stayed a long while. It is strange that his next job should be to tow a monitor over the old ground. I fancy that he prefers the rôle of tower to that of towee. I should. At length he came out looking very warm and comfortable, smoking a segar. We took the *Nantucket* in tow at about 8 a. m. Stopped for a short time off the Battery for loose powder, and then off for Dixie. Our cabin service being in confusion, we were invited to breakfast in the wardroom. This, however, was rather late in the day and I should have been pretty hungry if it had not been for a package of sandwiches which my dear mother put in my overcoat pocket just as I left the house. Instead of sitting down and crying as some women would have done, she went to work making sandwiches—and very good they were too. I timidly offered one to the captain, which he graciously accepted, and apparently ate with great relish. It is calm and the sea is smooth. The little "cheese-box" is making good weather of it, but I am quite satisfied with my quarters on the *Florida*. I think that the captain is also.

Eight bells have just been reported to the captain, and he has graciously ordered them to "make it so."

March 10th. The weather was cloudy in the morning and later quite a fall of snow. At about mid-day it cleared off nicely. At 6.30 p. m. made Cape Henlopen. The weather looked as if it were going to be nasty. We therefore anchored inside of the

breakwater to wait for better weather, or at any rate to watch it—not on our own account, but on that of the *Nantucket*—a burnt child dreads the fire. A lot of the old *Monitor* men are with us. I don't think any of them exactly hanker for "cheese boxes," in a storm on the North Atlantic.

The crew had gun drill to-day which interested me very much.

March 11th. Snowed before breakfast, but cleared up afterwards. The "cheese-box" is doing fairly well. Her decks are awash all of the time, but so far the lid of the box has stayed above water. No signs of life on her, except an occasional signal. I would rather go to Davy Jones' locker in a wooden ship, like a gentleman, than be boxed up in a metallic coffin.

Captain Bankhead is a splendid fellow and charming companion, though he never forgets that he is captain. We dine alone in the cabin every day, and chat together like old friends, but when on deck all this intimacy ceases at once. His Royal Highness solemnly paces the deck, on the starboard side, while his quondam friend, little Mr. Post, timidly walks up and down the port side, or leaves the sacred quarterdeck altogether, respectfully touching his cap when spoken to. The men were all called to quarters this afternoon, the marines being paraded on the port side of the quarterdeck. We then had gun drill, which is always interesting. I wonder how soon we shall be using the guns seriously, and hope that Mr. Post won't turn out a slob when the time comes. Captain Bankhead told me a story the other day of a former clerk who was a little "gun shy." They were going into action, and he heard him say, "Quartermaster, if I get hit you will take me below, won't you?" "Aye! Aye! sir, all that's left of you!" A man must have lots of moral courage to make an ass of himself that way on a man-of-war.

Expect to be off Fortress Monroe to-morrow. We are now, at 7.30 p. m., somewhere off Assateague light.

March 12th. Men drilled at the guns. Strange ship in sight. Ship cleared for action, in case she should prove an enemy. She was evidently English, quite an excitement! She turned out to be the *Adela*, a prize captured from English owners, on her way to New York with prize crew. No wonder that we took her for a privateer. We are now somewhere off Hatteras, at 7.30 p. m. Weather looks threatening. I sincerely hope that we shall not have trouble with the "cheese-box," which—thank God!—is still afloat.

March 13th. Fine day, "cheese-box" still above water. This morning she had a little piece of dry deck, and it was funny to see a group of officers venturing out on it, and running back for fear of getting their feet wet, like children playing with the surf on a sand beach. The water pitcher has just slopped over this page. It would have been a pity had any of these records been obliterated, and thus lost to future generations. It is 7.30 p. m., and we are somewhere off Frying Pan Shoals.

March 14th. Passed through the blockading fleet off Charleston this afternoon. Had a chance to see Fort Sumter, with emotions that I shall always remember. It was strange to stand on the hurricane deck and look at the grim old fort, now in the hands of traitors to their country and their flag. I felt as if I wanted to sail in, at any cost, and rescue it from its enemies. I wonder if the reckless conspirators who fired that first shot realized the misery that it was to carry in its path, and that it would go on and on through every hamlet in the North, calling a nation to arms. As I looked a puff of smoke curled upwards from one of the batteries, then came the sharp report of the gun. One of the vessels had got too near. The sea to-day is smooth as a mill-pond. We have got in the land of summer, but men are fighting just the same. How will it all end? Sent some letters home.

March 15th. Dropped anchor at 9 a. m. in the harbor of Port Royal, having successfully delivered the *Nantucket* at her destination. May my blessing go with her!

The harbor is a beautiful, but very busy place. The navies of the world might lie here at anchor. Quite a city has sprung up. After the war I wonder what its future will be? A bunch of broadbill ducks are within 30 yards of our stern, and new bunches are constantly stooling in to them. A man with a good ducking outfit there might have the day of his life. I stood for some time watching them and wondering where I should hold, as we say on Long Island, as the bunches stooled in. We are after bigger game now, so I fear that the ducks will have to have a rest. I scraped acquaintance with Lieutenant Dana Greene to-day, our executive officer. He seems to be a very good sort. He was the man who fought the *Monitor* after Worden was wounded, and who finally drove the *Merrimac* back to Norfolk.

March 16th. Captains Rodgers, Ammen and Fairfax lunched with us to-day. The talk of these big wigs was very interesting.

They do not seem to think that the monitors will end the war. They are painfully slow, by no means invulnerable and utterly unseaworthy. Under water they are just as subject to attack by mines as any other craft. In fact, rather more so on account of their slowness in maneuvering. They are almost impossible to live in, in a hot climate. The condensed moisture simply runs in streams from their bulkheads. In fact, you can write your name with your finger on the walls of the cabins. My brother George writes me: "What do you think of the ironclads now that you have seen them near by?" I am cautioned not to talk. I shall therefore forget to answer his question. At 3 p. m. started for Fortress Monroe. Not sorry to get in motion again. There is a rumor that we are to tow the new *Keokuk* down. Our chances for a roving commission seem to be fast disappearing. Are we to be turned into a sort of navy tow-boat? At about 10 p. m. I was sitting in the cabin, smoking and reading. That is to say, my eyes were fixed upon a book. In fact, I am afraid that I was just a little homesick. At any rate, I was thinking of home. I saw them all at Waverly Place, just as if I were there, and hated to move lest the picture should fade. Suddenly there was a click, which soon swelled into the ship's rattle over the hatches, summoning "all hands to quarters." With three bounds I was on deck, where I found guns being cleared away, men rushing about in every direction, the captain giving rapid orders, and I fear indulging in a talent for emphatic objurgation of which I had hardly believed him capable. In fact, to me who had never seen "night quarters" on a man-of-war, it seemed like inextricable confusion. I had hardly reached the deck when the captain told me to run forward and tell them to spring the rattles over the forward hatch and keep them going until every man was on deck. Off I went, stumbling over somebody or something every step I made. Executed the order and returned. The confusion was over. Every man was at his post and the silence was almost oppressive. We looked anxiously for the rams, which many thought were upon us. They were not to be seen. It was a sell!! Quarters for practice!!

March 17th. Nothing to record.

March 18th. Fine day, rather heavy sea. At 10 a. m. a suspicious looking brig right ahead, behaving queerly and apparently trying to get out of our way. We made for her, when she kept

off before the wind and set light sails. It looked like business. Groups of officers and men collected. Each had his own theory of what she was, and each was calculating his share of the prize money. After about an hour's chase we overhauled her. She said she was from Baltimore, bound for New York. As she was then off Hatteras, she was rather out of her course, and we all felt correspondingly happy. She had been ordered to "lay to," but the officer sent on board, although morally certain that they were lying, could discover no legal proof against her, so we were forced to let her go. The temper of the ship's company was not good. We had hardly hoisted up the gig, which had returned from "the prize," when a steamer was discovered on the port bow, bark rigged, evidently a regular built man-of-war, but no one could place her. The stranger fired a gun, we beat to quarters. The captain sent me for the signal book. We hoisted our numbers. The stranger answered, but there was trouble about her numbers. For a time it looked interesting. The stranger turned out to be the *Sacramento,* a new gun-boat, just in commission, and her numbers were not in our book. Of course, no one knew her. She is a rum looking lady anyway. Probably another emanation of Washingtonian genius. Rather a hectic morning. Owing to these delays, we shall not get to Hampton Roads to-night. We do not know whether the Cape Henry light is lit or not, so we shall stand off until morning and then run in.

March 19th. Made Fortress Monroe at about 8.30 a. m. Ran up as far as Newport News, where we now are, with the wrecks of the *Congress* and *Cumberland* on either side of us. The captain of the *Keokuk*—one of the recent experiments—came on board and made himself very agreeable. His vessel has had a series of accidents. I don't think he is in love with her, but he hopes that she will soon be ready. I have not seen her, but hear that she is a freak. I heard some surprising revelations about ironclads, which I do not dare even to record here. I was so urgently told not to mention them. It has snowed pretty much all day. Dear old General Dix is in command at the Fortress and Charlie Dix is on his staff. To-morrow or the day after I shall try to get leave to call on them.

March 22d. Got leave and went to Fortress Monroe to-day. The surprise of the General and Charlie was very funny. They received me with open arms, and insisted upon my staying to

lunch. The commanders of two English corvettes that are here were calling when I arrived. I was introduced as "Mr. Post of the navy," which might mean anything from admiral to cabin boy. We had a very jolly meal and Charlie insisted that I should ride out with him and take a look at some of the historic ground. I told him I had only leave for the day, but hearing that Captain Bankhead was ashore, we found him, and he cordially consented that I should dine and pass the night at headquarters, reporting by the 10 a. m. boat the following day. Had a charming ride through the village of Hampton, which Macgruder burned. It is a desolate looking place, and its destruction seems to have been an unnecessary piece of vandalism. War is rough work at the best!

March 23d. Clear day. Took breakfast at headquarters and returned on board by 10 a. m. boat. Found the captain of the *Juniata* in the cabin. He is a jolly old sea-dog. Another high-flyer came in too. I forget his name, one of the glum kind. Afterwards the captain went off on a round of visits himself. I find that Harry Van Brunt, George's old chum, is secretary to Admiral Lee, or "Old Triplicate," as he is called in the squadron. I am happy to say that Van Brunt writes a worse hand than I do.

We had the two Englishmen, whom I met at headquarters yesterday, to dinner to-day. They are the captains of two vessels, now in the Roads, the *Desperate* and *Vesuvius,* and a rather characteristic incident occurred, which may amuse my grandchildren. So here it goes in the diary. The captain did not return until nearly dinner-time. The first thing he did was to send for me and say, "Mr. Post, I have been detained with the admiral all of the afternoon, and at his request I have asked two English officers to dinner on board to-night. Send for Thomas and see that we have a good dinner. I have got to hurry and dress." I replied, "Are they the *Desperate* and *Vesuvius* men? Yes! what do you know about them? A good deal—I lunched with them yesterday at General Dix's, we are great friends."

"That is very fortunate. If they come alongside before I am dressed, go on deck and make my apologies. Bring them down in the cabin and amuse them until I come." In a short time I heard their boat, and got on deck, just as they were being piped over the side, with all of the honors. I stood discreetly in the background until all of the formalities were over, and then

advanced to meet them. They remembered me at once, and said several pretty things about the unexpected pleasure of finding that the *Florida* was my ship. I invited them in the cabin, made the captain's apologies, and offered them sherry and bitters. They were very admiring in their remarks about our spacious quarters, saying that they were more like those of a ship-of-the-line than the cramped affairs one usually found on a corvette of our rating, and remarked that it was only in war that such chances occurred. One of them then turned to me and said, "You men are getting spoiled. Think," turning to his companion, "of Mr. Post being executive officer of a boat like this at his age."

I laughed and quietly remarked that if he had said captain's clerk he would have probably come nearer my grade in the service. "Oh!" with that peculiar intonation, which only an Englishman can attain, when he wants to be disagreeable. Many Americans strive for it, but they strive in vain. One must be "To the manner born." He turned on his heel and the other man turned in the opposite direction.

They had been received by a captain's clerk!!!

The Trent[1] affair has just been closed, but for a moment it looked as if we had on our hands another international episode of equal gravity.

Just then Captain Bankhead made his appearance. Man of the world that he is, he took in the situation at a glance. After shaking hands with them, he said, "I must introduce my friend, Mr. Post; I thought you knew him. Mr. Post is a young gentleman of fortune (God save the mark), the son of a friend of mine. He wanted to have a hand in the war, and I persuaded him to come off with me for a cruise and share my cabin."

"A very plucky thing indeed I'm sure. I trust you like the service, Mr. Post." The ice was thawed. My social standing was

[1] During the latter part of 1861, James M. Mason and John Slidell, envoys from the Confederacy to France, were captured from the British steamer *Trent* by Captain Wilkes, of the U. S. S. *San Jacinto* and taken to Boston as prisoners of war. There was great rejoicing in America and Captain Wilkes was given a complimentary dinner. Under an ultimatum from England, the United States was forced to apologize and give up these prisoners, to the great chagrin of the navy and also of the country at large. Under the American theory of international law, Captain Wilkes was probably wrong, and the capture *was illegal*, but, the apology produced great irritation in the navy.

established and all went as merry as a marriage bell. They are really two very good fellows, but I think with a little leaning to the South. After dinner the usual toasts were drunk, and the usual talk about the same language, the same traditions, the same race, was gone over for the hundredth time, when the captain rather abruptly cut it short by saying: "Gentlemen, while our countries are at peace, officers of Her Majesty's Navy will be always welcome on my ship, and receive the very best I have. If our countries are ever at war, they will get the best I have then. Mr. Post, pass Captain ——— the sherry. His glass is empty." For a moment I was frightened, but the old man is such a perfect gentleman that one may be pretty sure that he will never put his foot in it. Our miserable back-down in the *Trent* affair is pretty recent, and the navy would like to wipe it out if we ever get our hands free.

March 24th. Started this morning for the blockade off Wilmington. Our hopes for a roving commission are gone. I wish, at least, we were going to Charleston. It is raining and blowing hard.

March 25th. Still stormy. A miserable chop sea. We are in the Gulf Stream. With the current against us and a head wind we are not making much progress. The difference in temperature, in and out of the Stream, is very perceptible. I awoke this morning oppressed by the heat. Went on deck without a vest, in a flannel jacket. As we left the Stream the weather grew colder, and the motion of the ship much easier.

March 26th. Our duties have fairly begun. Here we are on the Wilmington blockade. Our station is on the southern channel of the northern entrance. At night the ship is required to be kept in the most perfect silence. No lights of any kind are shown. It reminds one of a great hunt, the way in which we lie, waiting for our *game*. Even the bells are reported to the officer of the deck, and not struck; the cable is ready to be slipped at a moment's notice. We are constantly under steam. At present there is a most romantic moon, which I have been getting rather spooney over, but it spoils sport. One of our ships took a prize the other night worth $500,000! "Next, please!" All my soiled clothes are stuffed in the air-port of my stateroom. They do not improve the ventilation.

March 27th. Tried fishing this morning. No luck. Had quite an excitement this afternoon. The flagship signalled strange vessel in sight. The stranger turned out to be the *Iroquois* back from Beaufort, where she has been coaling. I hope that she brings mail for us. My boarding cutlas was served out to me, to-day. So I feel quite war-like. We have just run in to our night position, quite close to the batteries. This is rather an agreeable relief from the deadly monotony of the day work. I am beginning to get quite interested in the game. It is very tantalizing to see daily the "Rebel" flag flying from the forts on shore. There are now two or three vessels in plain sight, lying under the batteries ready to run out. Why don't we get up a party to "cut them out"? Jack Easy and Mesty would have done it.[2]

March 28th. This morning at breakfast the captain remarked, with a sort of twinkle in his eye, "We lost an anchor under the batteries last night, and I am going to get it, so you may have a lively morning. I left a boat over the place and we shall grapple for the cable." Just then the orderly made his appearance at the cabin door, and saluting said, "The officer of the deck desires me to report that the batteries have opened on us and that a shot has just passed over the quarterdeck." The captain laughed and said: "I thought that we should hear from them. Finish your breakfast Mr. Post, I shall not beat to quarters. When you get through come up and see the fun." Finish my breakfast! Well it seemed to be the correct thing to do, but my last fish ball wandered about my mouth and failed to get pointed for the trachea with perfect precision. I think he was somewhat troubled with similar difficulties. He went on deck and I almost immediately followed. They had got the cable and were engaged in hauling it aboard with the anchor—a job which would take from 10 to 15 minutes—and there we were, a fair mark for "Johnny Reb" to practice at. Everyone was on a broad grin and appeared to enjoy the sport. There was nothing to do, so I made up my mind that I might as well have my after-breakfast pipe. We are allowed to smoke on the port guard. This is a sort of platform outside of the rail of the ship, and aft of the wheel-house, which one approaches by stooping down and passing through a square port. We had our

[2] Those of my grandchildren who have not read that best of all sea stories, "Midshipman Easy," by Captain Marryatt, had better complete their education at once by reading it.

starboard side to the shore. I lighted my pipe and stood with my elbows on the rail, looking inboard. Several of my wardroom friends gathered on the port side of the quarterdeck and commenced chaffing me, and explaining the dangers from splinters, etc., of long-range shell-fire. Pretty soon there was a puff of smoke from the battery, then a silence that seemed about an hour, probably not much over 40 seconds, and some one said, "There she comes," and sure enough there was a black speck in the air apparently coming right at our heads. No one ran, or showed any signs of alarm, but my chaffing friends suddenly remembered little things which they had forgotten to do in other parts of the vessel. I thought that I too might as well see how the bow of the ship looked, but to do this I had to stoop to crawl through the port. As I tried to do so the shot fell in the water about 100 yards short. I at once put my pipe back in my mouth and, as they slowly sauntered back, greeted them with harmless banter. I don't think that I shall hear anything more about "the surgeon's instruments, the details of the doctor's cockpit, or my *first baptism of fire.*" The batteries fired five or six more shots, none of which hit us, and by that time we had our anchor catted and fished and stood out of range. So now I have been under fire. There was not a great deal of gore in this my first battle. I think that I can honestly say, that, while a trifle worried, I was not badly scared. Some of the old stagers tell me that that sort of thing is rather more trying than when you have the excitement of hitting back. The Rebs have some English *Whitworth* guns, and the old hands were very admiring of the way in which they were served. I caught a sea bass to-day and we had it for dinner, and it was very good. There goes another shot. It is now bed time. There seems to be no row, on deck, so I suppose it is just ill nature on "Johnnie's" part. I think we got on their nerves this morning. I shall probably hear in my next mail how the N. A. B. S. [North Atlantic Blockading Squadron] made an attack, in force. How the *Florida* was disabled and limped out of range. Poor mother!

March 29th. Northeast storm. It does not seem much like Sunday. Mr. Green and the Paymaster Keeler dined with us in the cabin to-day. I have passed most of the day smoking and reading the "Life of Washington Irving." The captain is at the other side of the cabin table, reading father's book, which I stole, the "Echo des Feuilletons." I have quite fallen in love with

Irving from reading his life. His letters to his family show a lovely nature and are marvels of ease, elegance and wit. I am working hard at the technical part of sea life, and have ordered an ordnance manual, Captain Totten on Seamanship, and an elementary work on navigation. The captain laughs at my thirst for knowledge and wonders how I mean to use it. He says that there is no use in my thinking of the regular line in the navy, but that the marines, or a paymaster's position, are open to me; that the marines are not at all looked down upon now; that, on the contrary, they are a very fine corps. I shall not take long to choose. A bank clerk, in uniform, does not appeal to me. I must write again to father about my marine appointment. I fear that he has not entered into the project with much enthusiasm. I wish that I could make them see that it is my settled choice of a profession. God knows I do not want to "estrange myself from my family" and all that sort of thing, but I know that I would make a fair officer, a bad merchant and worse lawyer.

April 1st. Pretty stupid work this blockading. In one of her letters, mother hopes that I will not become enamored with this life of adventure!!" If I had been in search of the millenium I could not have come to a better place! We never see an enemy, from morning until night. I told her she could get a fair idea of our "adventures" if she would go on the roof of the house, on a hot summer day, and talk to half a dozen hotel hallboys, who are generally far more intelligent and agreeable than the average "acting officer." Then descend to the attic and drink some tepid water, full of iron-rust. Then go on the roof again and repeat this "adventurous process" at intervals, until she was tired out, and go to bed, with everything shut down tight, so as not to show a light. Adventure! Bah! The blockade is the wrong place for it.

At 3.30 a strange sail was reported. Gave chase. It turned out to be the brig *Perry* which vessel is stationed about 10 miles up the coast, at Masonborough Inlet.

April 2d. The captain thinks that there is a prospect of our getting away from this cursed blockade and going, perhaps, to the West India station. Anything to break this horrible monotony would be perfectly delightful. We are all tired out.

April 3d. Nothing.

April 4th. Same dreamy monotony.

April 5th. Muster of the crew this morning, it being Sunday. In the afternoon went up to the flagship to get news. Quite pleasant to be in motion, if only for a short time. This evening had a laugh at the look-out, who hailed, "Light Ho!" on the port quarter. Quite an excitement, until we found out that the fool had mistaken the moon for a light, as it rose out of the water like a ball of fire.

April 6th. A good deal of firing from the forts. No harm done and much powder wasted.

April 7th. Supply ship *Massachusetts* arrived to-day bringing fresh meat, ice and papers. No mail, as she came from Philadelphia. Ordered, by the flagship, to stand to sea after a sail reported in the northward. The sail was, of course, the brig *Perry*. *State of Georgia* arrived from Beaufort this evening. I suppose she brings letters.

April 8th. In the morning chased a schooner, could not prove anything against her. Came back and got our mail from the *State of Georgia*. Changed our position to one about five miles further north. The new sloop *Ossipee* joined us to-day. Pretty exciting day for the blockade.

April 9th. Sent off 11 letters. I suppose each recipient will expect news from the "Seat of war." Won't they be pleased!

Extract from a letter to my brother George B. Post of April 8th:

The attack upon Charleston has commenced. With regard to that, I will tell you all that I am at liberty to tell, and even this had better not be noised abroad. This attack will last several days and be sustained almost entirely by the monitors, who are anything but perfect, by the *Ironsides* and *Keokuk*. The latter vessel is untried with reference to her armor, but is very fast, going 11 knots an hour, which speed she can probably improve upon. The great difficulty to be apprehended is from torpedoes and a submerged netting of ropes which extends all over the channels, sunk so low as not to be visible, but which they have the power of tautening just as a vessel is passing over and thus fouling the screw. It is generally conceded amongst naval men that Fort Sumter will be entirely demolished, that two or three ironclads must be sunk and that the capture of Charleston is very problematical. However, we must hope for the best. The weather was good during our entire passage to Port Royal. Capt. Rodgers is much blamed by naval men for calling the monitors good sea-boats. They are not worth a cent in a sea way.

April 10th. We are beginning to worry about the attack on Charleston. There are no signs of exultation on shore, so I hope that we have been successful. or at least sustained no reverse.

April 11th. The *Violet,* a regular New York tugboat, armed with one or two small guns came puffing in to-day, coming last from Beaufort, so she brought some letters and papers. She reports the fighting at Charleston to have commenced on Thursday, the 9th. No further news. We have just run in very close to the batteries. I hope that they won't find us out and give us a shot.

April 12th. I have been sitting on the port guard this morning listening to Williams and Wagstaff, two of our acting wardroom officers, swap lies until I nearly exploded with laughter. I wish that I could remember all that they said, but their stories would lose their charm if I tried to write them out. First one would tell of having been a cook, when he was hard up, once upon a time, and then the other would rejoin with his experiences as hotel porter, each seeming to be rather proud of the versatility of his talents. If they were first-rate seamen—these acting officers—it would not so much matter. Many of them are, but a lot of them are just ordinary river steamboat men—the sort of fellow who helps you on board with your bag, heaves the casting line as you approach the dock and handles the chain box forward. It does seem rather hard on the regular navy to have them invade the wardroom, but we had to have a lot of officers in a hurry and here they are!

EXTRACT FROM LETTER TO MY FATHER.

N. A. B. S., April 12th, Evg.

We have run in to about a mile and a half of the shore, and are waiting patiently for a steamer expected out. In fact, I do not know that she did not get out last night. They fired a gun from shore this morning for no apparent reason, which is their usual way of telling us—a sort of bravado—that a vessel has just run past us. I wish that some of you people in New York, who are so fond of talking of the negligence of the blockade, could be here some of these dark nights and see how we are situated. Your only wonder would then be how we ever stopped any of them. There are five vessels to guard about five miles of coast, leaving an interval of over half a mile between them. You can see about 50 yards on each side of the ship. As far as I can see, if they do not stumble upon us by accident, they are pretty sure of running by.

We first heard that the attack on Charleston began on Monday. We are now informed that it did not open until Thursday. There are no troops there to support the navy, and we are not at all sanguine. If they attack Sumter, it must fall. If they try to run by, what can they do? There

are no troops, every one expects the fight to last several days and that several of the ironclads will be sunk. There will be eight or nine of them there.

Note by the Editor.—The youthful strategist does not half state his case in respect to the efficiency of the blockade. He omits to say that, of the five vessels of the fleet, at least one, and often two, were necessarily absent coaling. Of course the blockade was only run at night and the runners generally picked a pretty dark one for the purpose. Our fleet could show no lights of any kind. We consequently had to lie at anchor, or we should constantly have been fouling, and firing, into each other. Two or three modern search-lights would have come in very handy!

April 13th. Amused myself taking sights of the sun to-day with some of the other greenhorns, who are practicing. I have struck up quite an intimacy with Mr. Washington Fairfax. The owner of this somewhat imposing name is our gunner's mate, and is commonly called "Wash." Where his name came from I cannot say. He is an old *Vandalia* man, and we sit for hours together on the deck forward and he holds forth on knots, splices and hitches. He seems to take a delight in mystifying me by the miraculous way in which he twists a rope about and finally evolves a stupendous snarl, which he calls by a stupendous name. Sailors are queer things. They make all of their own clothes, from their shoes to their hats, and some of them embroider as beautifully as any woman. Grass has been served out and they are making their hats to-day. "Wash" is teaching me to "lay up the sennit," which is the nautical name for the operation. We had rather a joke on poor old "Wash" the other day. He was on the hurricane deck with a glass reporting shots from the shore batteries. By some chance he got a Whitworth shell right in the field; it, of course, seemed to him about 20 feet from his head. He gave a yell, and jumped behind the wheel-house. He will *hear of it for some time!* The beach is a perfect blaze of bonfires to-night. Perhaps they have heard of a victory, or perhaps they are beacon lights for a vessel. They are always up to some deviltry.

April 14th. Worked on my hat and talked to "Wash." Rather an amusing incident occurred, showing that the crew fully appreciate the acting officer. Dana Greene was housing the quarter-deck awning, and the "after guard" were "piped aft" for the purpose; some of them were new hands and too many of them got up on the port rail. His request to these gentlemen to get down and go on the starboard side was classic in its vigor.

"Wash" must have seen a twinkle in my eye for he said, "He is a fine officer, sir, I'd rather be cussed by a man like him than—" and he looked at the acting officer of the deck. I remarked, "'Wash,' you promised to show me a long splice to-day. Don't you think you had better get to work?" He took the hint "verb sap."

April 15th. Heard rumors of the repulse at Charleston to-day, and also that the steamer which we had been watching had succeeded in running the lower blockade. Bad luck seems to be the rule nowadays.

April 16th. This morning the watch on deck heard a steamer, slipped anchor, but could not find her. As soon as day broke we had the pleasure of seeing her under the shore batteries. We have received intelligence that 12 more are expected hourly. To-night we shall run very near shore and lay for them. Received to-day by the *Massachusetts* particulars of the repulse at Charleston. As we supposed, they had the harbor all marked out with buoys, so that they had the exact range of all of our vessels. We have the rumor, however, that they were doing fairly well, when Mr. Lincoln's private secretary turned up and called them off. I should like to express an opinion, but suppose I had better not.

April 17th. Like a fool, slept in my clothes, expecting some excitement before morning. In the afternoon a strange sail was reported to the northward. After standing out, for about 10 miles, overhauled her and sent a boat on board. She proved to be a schooner from Beaufort to Port Royal. This afternoon saw a big steamer in the southern entrance. Hope we shall catch her—not sanguine.

April 18th. *Mt. Vernon* returned bringing mail.

April 19th. Muster and articles of war in the morning—Sunday.

April 20th. Worked at my hat and spun yarns with "Wash." He did most of the spinning.

[TO BE CONTINUED]

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SUMNER LINE BY TIME-SIGHT REDUCTION

By MALCOLM MCNEILL

Professor of Mathematics and Astronomy, Lake Forest College

The writer hesitates to add another to the already considerable number of methods of determining the Sumner line; but the method proposed seems to offer several advantages in the matter of simplicity and brevity.

It is, in short, a time-sight method of reduction differing from the method given in Bowditch only in that the half-hour angle is determined by the tangent instead of the sine. The same number of logarithms is needed by either formula, but when the tangent form is used a combination of two of the logarithms already used in the computation will give the tangent of half the azimuth. Thus there is no need for a special azimuth table or diagram, the whole computation being made by the ordinary table of trigonometric functions, Bowditch No. 44.

Just as in the determination of the Sumner line by the ordinary time-sight formula, a point directly on the line is obtained, and the azimuth of sun or star changed by 90° will give the direction of the line. There is, therefore, no altitude difference to be applied to the assumed position before the line is drawn. While this is a small matter to the experienced navigator, I have found it to be a source of considerable perplexity and not infrequent error to students who are beginning the subject. As far as I know, the student always is taught the time-sight reduction, and may be counted on as having a reasonable familiarity with an ordinary table of logarithms.

The formulas used are given in any of the present-day textbooks on spherical trigonometry for the case in which one or more angles are to be determined from three given sides. The angles may be determined as sines, cosines or tangents, but where more than one angle of the triangle is to be determined, the tangent formula is much the best. In the pole, zenith, sun triangle, the

ordinary time-sight reduction determines only the angle at the pole (the hour-angle), and the sine formula generally used gives this with sufficient accuracy, although not quite as accurately as the tangent formula; but to get the angle at the zenith (the azimuth), a complete recasting of the sine formula is needed while the tangent formula gives the azimuth almost at once.

The Computation.—Get corrected altitude and Greenwich apparent time (or Greenwich hour-angle in case of a star observation) precisely as in an ordinary time-sight observation, also assume a latitude not far from the dead reckoning latitude. The formulas for local hour-angle and azimuth are then as follows using the Bowditch notation, except that "s" is not the same as the Bowditch "s." Get complements of altitude, declination and latitude, giving zenith distance (z), polar distance (p) and co-latitude ($co\text{-}L$).

Then $s=\frac{1}{2}(z+p+co\text{-}L)$. Find $s-z$, $s-p$ and $s-co\text{-}L$.

Check for this part of the computation

$$2s=s+(s-z)+(s-p)+(s-co\text{-}L).$$

Then compute the auxiliary

$$v=\sqrt{\operatorname{cosec} s\cdot\sin(s-z)\cdot\sin(s-p)\cdot\sin(s-co\text{-}L)}.$$

Finally, $\tan\frac{1}{2}$ hour-angle $=\dfrac{v}{\sin(s-z)}=\tan\frac{1}{2}t$, and $\tan\frac{1}{2}$ azimuth $=\dfrac{v}{\sin(s-p)}=\tan\frac{1}{2}Z$.

Check.—A very good check if desired may be obtained from the time and altitude azimuth formula given in Bowditch, p. 148, Section 358.

$$\sin Z=\sin t\cdot\cos d\cdot\sec h,$$

or by a slight modification of this

$$1=\sin t\cdot\cos d\cdot\sec h\cdot\operatorname{cosec} Z.$$

That is, the sum of the logs of the four factors on the right should be zero, since $\log 1=0$.

When the azimuth is obtained from azimuth tables this check does not amount to much unless great care is used in the necessary interpolations, but by the proposed method the azimuth is obtained as accurately as is the hour-angle and the check is worth using unless the navigator is very accurate in his work.

Example.—On Tuesday, July 2, 1918, Reserve Lieutenant C. S. Dewey measured double altitudes of Vega and Arcturus at his

residence west of Great Lakes Naval Training Station. Greenwich times by comparison of watch with Western Union standard time.

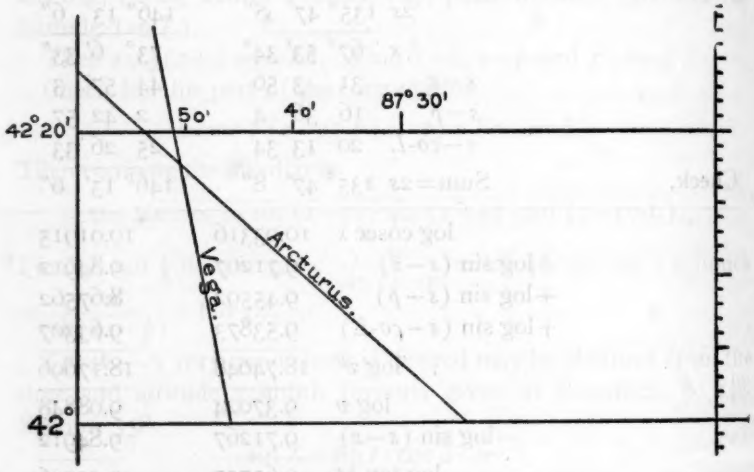
The preliminary reductions of observation and almanac data give the following:

		Vega E.	Arcturus W.
Greenwich hour-angle		$2^h\ 35^m\ 49^s.8$ W	$7^h\ 10^m\ 17^s.7$ W
Corrected altitude	h	53° 10′ 22″	61° 50′ 30″
Declination	d	38 42 30	19 36 24
Assumed latitude	L	42 20 N	42 20 N
Zenith distance, $90°-h=z$		36° 49′ 38″	28° 9′ 30″
Polar distance, $90-d=p$		51 17 30	70 23 36
Co-latitude, $90-L=co\text{-}L$		47 40	47 40
	$2s$	135° 47′ 8″	146° 13′ 6″
	s	67° 53′ 34″	73° 6′ 33″
	$s-z$	31 3 56	44 57 3
	$s-p$	16 36 4	2 42 57
	$s-co\text{-}L$	20 13 34	25 26 33
Check,	Sum$=2s$	135° 47′ 8″	146° 13′ 6″
	log cosec s	10.03316	10.01915
	+log sin $(s-z)$	9.71267	9.84912
	+log sin $(s-p)$	9.45592	8.67562
	+log sin $(s-co\text{-}L)$	9.53873	9.63307
	log v^2	18.74048	18.17696
	log v	9.37024	9.08848
	−log sin $(s-z)$	9.71267	9.84912
	log tan $\frac{1}{2}t$	9.65757	9.23936
Computed hour-angle,	t	$3^h\ 15^m\ 33^s.0$	$1^h\ 18^m\ 45^s.2$
	log v	9.37024	9.08848
	−log sin $(s-p)$	9.45592	8.67562
	log tan $\frac{1}{2}Z$	9.91432	0.41286
	$\frac{1}{2}Z$	39° 23′ 5″	68° 52′ 8″
Azimuth of star	Z	N 78 46 10 E	N 137 44 16 W
Greenwich hour-angle		$2^h\ 35^m\ 49^s.8$ W	$7^h\ 10^m\ 17^s.7$ W
Local hour-angle		3 15 33.0 E	1 18 45.2 W

Computed longitude	$5^h\ 51^m\ 22^s.8$ W	$5^h\ 51^m\ 32^s.5$ W
	$= 87°\ 50'\ 42''$ W	$87°\ 53'\ 10''$ W
Assumed latitude	$42°\ 20'$ N	$42°\ 20'$ N
Azimuth of line	$168°\ 46'\ 10''$	$132°\ 15'\ 44''$

Concluded position, Longitude 87° 50′ W
Latitude 40 18 W

Check,		
sin *t*	9.87704	9.52749
cos *d*	9.89228	9.97406
sec *h*	10.22229	10.32614
cosec *Z*	10.00840	10.17229
	0.00001	9.99998



The limitation in the ordinary time-sight computation that it should be used only when the object observed is at a considerable distance from the meridian applies in only a small degree to the proposed method. The difficulty shows itself in the computation by the smallness of one of the angles $s-p$ or $s-co\text{-}L$, and the consequent uncertainty of determination of the log sin, which varies rapidly and not uniformly for a small angle. In this case the log sin may be determined with sufficient accuracy by the following device. Find the log of the number of minutes of arc in the angle from the log of numbers table (Bowditch No. 42), and to this add 6.46373. The result will be the log sin of the angle. It

will be correct to the fifth place of decimals for an angle less than 0° 27′. For an angle of 1° 0′ the log will be 3 units of the fifth decimal place too large, and for an angle of 1° 30′ the error is about 5 units. For angles more than 1° 30′, Table 44 will give the result with sufficient accuracy. The principle involved is that the sine of a small angle is nearly the same as its measure in radians and the 6.46373 is the logarithm of the reduction factor from minutes to radians. I have used the method when $s-p=0°\ 0'\ 31''.5$.

The advantage claimed for the Saint-Hilaire and allied methods that practically all of the computation can be made before the altitude is taken can be shared in nearly equal degree by the proposed method, provided that instead of observing the altitude at a predetermined watch time, the watch time be observed for a predetermined altitude. The longitude of the point on the Sumner line is then immediately determined by application of the watch time of the observation to a time already computed. This, with the assumed latitude and computed direction of the line, gives the data for drawing the line. But I have considerable doubt as to the advisability of either method. Too much depends on getting the altitude at an exact moment or getting the exact moment when a given altitude is reached. Of the two, however, I think the latter is the more accurate.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Change in Board of Control

Captains L. M. Nulton and G. W. Laws U. S. Navy submitted their resignations as members of the Board of Control and their resignations were accepted with regret by the Board on September 5, 1918.

New Members

It has been the experience at the Naval Academy that officers who have entered the navy since the beginning of the war are interested in becoming members of the Naval Institute when the object of the Institute is brought to their attention. As the Secretary reaches only a few of these officers it is requested that members afloat interest officers who are not members in becoming such.

Dues

It is requested that all members who have not paid their dues up to and including 1918, do so before the annual audit, January 1, 1918.

Regular and associate members of the U. S. Naval Institute are subject to the payment of the annual dues until the date of the receipt of their resignation.

Membership

Since 15 September 1918, 255 regular and 5 associate members have joined the Institute. Total membership, 5203.

Resignations: Five.

Address of Members

All members are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS *are to be sent, and thus insure their receipt. This precaution is now of particular importance as notices of changes of stations are not now available for use of the Institute's staff.*

Members and subscribers are urged to notify the Secretary and Treasurer promptly of the non-receipt of PROCEEDINGS, in order that tracers may be started. The issue is completed by the 10th of each month.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books, should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the Secretary and Treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations

Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Suggestions Invited

Members are invited to send to the Secretary comments, suggestions or criticisms on the make-up of the PROCEEDINGS, and to submit topics for essays.

Notice

Whole Nos. 145, 146, 147, 149, 155, 166 and 179 of the PROCEEDINGS (March, 1913, June, 1913, September, 1913, January-February, 1914, January-February, 1915, and November-December, 1916, January, 1918) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

ANNAPOLIS, MD., September 15, 1918.

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Photo by Central News Photoservice, New York.

A Demonstration of a New Smoke-Producing Device for Use on Merchant Ships. It Produces a Dense Cloud Which Lies on the Water and Blinds the Pursuing U-Boat.

A Demonstration of a New Smoke-Producing Device for Use on Merchant Ships. It Produces a Dense Cloud Which Lies on the Water and Blinds the Pursuing U-Boat.

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT W. B. JUPP, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING.
CHARACTERISTICS OF NAVAL VESSELS AND AIRCRAFT.
NAVAL POLICY.
MATÉRIEL.
PERSONNEL.
OPERATIONS.
MERCHANT MARINE.

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ARGENTINA

POWERFUL WIRELESS STATION FOR ARGENTINE.—It is anounced that the Marconi Company will build the largest wireless station in the world near Buenos Aires. The contract for the work has just been closed. The power of the new station will be 11,000 kilowatts, and three towers will be erected, each the size of the Eiffel Tower.—*Scientific American*, 17/8.

BRAZIL

BRAZILIAN TORPEDO-BOAT DESTROYERS.—In connection with our reference to Brazilian naval aid, in our issue of July 5th, we recall that ten destroyers were built by Yarrow and Co., Limited, of Scotstoun, for the Brazilian Government in 1908-10, and were described in our issue of July 2, 1909. They are named as follows: *Pará, Piauhy, Amazonas, Matto Grosso, Rio Grande de Norte, Parahyba, Alagôas, Santa Catharina, Parana, and Sergipe.* All are of the same dimensions, viz., 240 feet long by 23 feet 6-inch beam, and displace about 560 tons. They are propelled by two sets of triple expansion, four-cylinder engines, and two double-ended Yarrow water-tube boilers, each boiler supplying steam for about 4000 indicated horse-power. Both in propulsive machinery and general design these destroyers possess features which, at the time they were built, caused them to be considered as exceptionally efficient and powerful rep-

resentatives of their type, and which even today entitle them to a place in the front rank. The armament consists of two 4-inch and four 47-millimeter Q. F. guns, with two torpedo-tubes. In the course of her trials on the Clyde the *Pará* attained a speed of 27.5 knots, and other vessels of the group reached still higher speeds. The coal capacity of 140 tons gives them an unusually extended cruising radius. The living quarters for officers and crew are spacious and airy to a degree unknown in the average destroyer of ten years ago.—*The Engineer*, 26/7.

CHILE

CHILE INDIGNANT OVER PLOT TO DESTROY SHIPS.—The attempts of German crews to destroy their interned ships in Chilean harbors Tuesday night has caused a wave of indignation to sweep through Chile. The plot to destroy the ships apparently was fully planned, as crews in three different ports acted simultaneously, using dynamite to destroy the machinery of their vessels.

The German steamers interned in Chilean ports number thirty-two, while the total number of sailing vessels is fifty-seven. The tonnage of the steamers and sailing vessels aggregate 230,000.

Seven of the steamers were damaged. Four were anchored in the harbor of Corral, where there is a strong German element; one was at the port of Valparaiso, and two, the *Karnak* of 7044 tons gross, and the *Thessalia* of 6047 tons gross, were lying off Antofagasta, one of the chief nitrate ports of Chile.

The government immediately took active measures to prevent depredations, ordering troops aboard the interned ships to maintain order. Rear Admiral Gomez, director-general of the Chilean ports, instructed the captains at all ports where German vessels are interned to guard the ships with the strictest vigilance.

Further action by the government has been temporarily blocked as a result of the resignation of the ministry on Tuesday. The matter now is resting until a new cabinet has been formed.—*Evening Star*, 6/9.

GERMANY

GERMAN NAVAL POLICY.—It has long been the opinion of those most conversant with the German politico-military system that the High Sea Fleet is being held back as a last reserve, but that it will be used without hesitation whenever the position of Germany on land becomes really desperate. The military disasters which the enemy has suffered in the last five weeks have obviously made a deep impression on his people at home, who, almost for the first time, have seen their most trusted leaders completely out-generaled and thoroughly beaten. The war map, to which in more prosperous times the German rulers so often and so arrogantly referred us, now reveals the magnitude of their own defeat, which even the skilled sophists who compile the Berlin bulletins are powerless to gloss over. Whether they will now decide to try a diversion at sea in the hope of restoring their falling fortunes on land remains to be seen. This is a question of more than academic interest. Knowing as we do the present strength of the Grand Fleet, which has been reinforced by the heaviest capital ships of the United States, we can afford to wait without the least apprehension for any move the enemy may see fit to attempt. But, on the other hand, it is well that the general public should be prepared for what may prove to be the decisive naval conflict of the whole war, especially as such a conflict will inevitably involve severe losses, not necessarily confined to the enemy's side. So little is heard of the German battle fleet in these days that its very existence is sometimes overlooked. We need hardly remind our readers, however, that the High Sea Fleet still represents a most powerful aggregation of naval force, or that it is con-

siderably stronger in every class of vessel than on the date of Jutland. In addition to newly-completed battleships and battle-cruisers, it has recently been strengthened by many smaller units of a distinctly formidable type, notably by fast light cruisers of heavy armament. Large numbers of destroyers also have been built, together with a new class of submersibles, which are said to have been specially designed to take part in fleet actions, and are therefore capable of travelling at high speed, besides being extremely easy to manœuvre. The units of this class are named after the more successful submarine officers, such as Weddigen, Hersing, etc. An important advantage enjoyed by the German naval forces is their ability to come out at a selected moment in full strength. Spending as it does most of its time in harbor, the High Sea Fleet does not suffer from the wear and tear of the almost continuous sea service performed by our own forces. At any given moment the enemy may confidently reckon on finding some of our most powerful ships absent from the Flag, undergoing repairs in dockyard. Consequently, if, or when, the opposing navies meet at sea, the enemy will assuredly be at his maximum strength, whilst we shall be at our average.

These and kindred reflections are suggested by news from Berlin, which indicates the existence of a serious naval crisis. Admiral von Holtzendorff, who for nearly three years had served as Chief of the Admiralty Staff, has left his post under circumstances that point to summary dismissal. He has been succeeded by Admiral Scheer, hitherto Commander-in-Chief of the High Sea Fleet, which he led at the Battle of Jutland. Semi-official writers, such as Captain von Kühlwetter and Count Reventlow, openly state that Von Holtzendorff's retirement was brought about by disputes concerning the right employment of the High Sea Fleet. Only one construction can be placed upon these admissions, to which must be added that passage in the Imperial order of August 3rd, addressed to Von Holtzendorff, which reads as follows:—"You have always maintained the fundamental offensive idea as regards the application of our weapons of war, and at the same time you have weighed soberly the forces on the other side, including the political forces." It is not difficult to read between the lines of this message, and of the semi-official articles dealing with the crisis. Strong pressure was evidently brought to bear by the Army Command on the naval authorities, with a view to forcing the latter to take the offensive. General Ludendorff, or whoever is in supreme control of military affairs, has discovered to his cost the reality of the American invasion. The "phantom armies" of the United States, which had been persistently belittled in the German Press, have now materialized with a vengeance, and it is largely due to their rapid deployment on the Western front that Marshal Foch has been able to deal those shattering blows which have wrecked the German military plans. Ludendorff, in common with every German soldier, had relied implicitly on the submarine war to prevent the arrival, in any substantial numbers, of American military aid. Unfortunately for the enemy, the U-boats have utterly failed in their task, and upwards of 1,300,000 United States troops have been brought across with negligible loss. They continue to pour in at the rate of 300,000 per month, an average that will certainly grow when the many new transports now being constructed in America pass into service. The position, therefore, is a very simple one. While German man-power is shrinking month by month with no possibility of replenishment, that of the Allies is increasing by leaps and bounds. At the present moment we appear to have a numerical superiority in the West. Six months hence, if American troops continue to arrive at the same rate, our superiority promises to have become overwhelming. That is the prospect confronting the German Command, and the remedy, whether practicable or not, is obvious. Unless she is able not merely to check, but to bring to a standstill for a long period, the transportation of America's armies to Europe, Germany will be faced with certain defeat. She has no alternative means of escape.

A momentary German success in this or that theater of war might postpone the end, but could not avert it. Germany must successfully impeach our command of the sea. Failing that, a time must come when, as an American contemporary puts it, she will have to choose between unconditional surrender and annihilation.

We have never favored the hypothesis of a dramatically sudden collapse on the part of the enemy. Knowing their whole future to be at stake, Germany's rulers are not the men to submit while a single shot remains in the locker, and since the submarine weapon has proved a broken reed, it seems to us a foregone conclusion that, sooner or later, the battle-fleet will be ordered out to do what the U-boats have failed to achieve. That, in our judgment, is the correct interpretation of the naval crisis which led to the dismissal of Admiral von Holtzendorff. He, it is evident, refused to accept responsibility for an order which he believed would doom the High Sea Fleet to certain destruction without any compensating benefit. Apparently Admiral Scheer, his successor, thinks otherwise, in which case he must be of a very sanguine temperament. But in all likelihood it matters little what personality is in nominal control of the German fleet, since he is a mere subordinate of the Great General Staff, which exercises supreme power over all the fighting forces. Beyond recording our belief in the contingency of a great fleet action, we shall not venture further into the dangerous sphere of prophecy. It is, however, permissible to point out that if the German fleet is to act at all, it must act quickly. Thanks to what has been aptly termed a miracle of transportation, United States troops are arriving in France in such numbers that their weight is already beginning to tell decisively on the Western front, and the strategical initiative has already been snatched from the enemy. For this reason we do not think that his expected reaction at sea can be long delayed.—*The Engineer*, 23/8.

HEADS HUN NAVAL STAFF.—Captain von Levetzow has been appointed Chief of the Naval Staff at German main headquarters, according to the CologneVolkszeitung and the Rhenish Westphalian Gazette.

Captain von Levetzow, it is said, has been granted greatly extended powers. He has been in command of the light naval forces and is best known for his operations against Oesel Island.—*Washington Post*, 8/8.

NEW GERMAN WARSHIPS.—The following information with regard to the launching dates, etc., of new German warships is available from semi-official German sources, but for obvious reasons the authenticity of these figures cannot be guaranteed. The battleship *Bayern*—ex *Ersatz Wörth*—was launched at the Howaldt yard, Kiel, on February 18, 1915, and commissioned on June 5, 1916. A sister-ship, *Baden*, built by the Schichau firm at Danzig, was launched October 30, 1915, and commissioned in January, 1917. Both vessels belonged to the normal 1914 program. They are known to be of approximately 28,000 tons, and are armed with eight 15-inch 50-calibre guns, and a numerous auxiliary battery of 5.9 inches Q. F. According to the original design the speed was to be 20.5 knots. The battle-cruiser *Lützow*, built by Blohm and Voss, at Hamburg, was launched on November 29, 1913, and commissioned early in 1915. She was sunk by gunfire at the Battle of Jutland. The battle-cruiser *Hindenburg*—authorized as the *Ersatz Hertha*—was launched at Wilhelmshaven Dockyard on August 1, 1915, and commissioned about 12 months later The *Mackensen*, a vessel of the same type, built by Blohm and Voss, took the water on April 21, 1917, and is reported to have joined the High Sea Fleet last March. A third battle-cruiser, *Graf Spee*, built at Danzig by Schichau, was launched September 15, 1917, and is not yet complete. The *Hindenburg* and *Mackensen* are understood to be sister-ships, displacing at full load about 30,000 tons, with a designed speed of 30 knots. Their armament has been variously given as eight 12-inch,

ten 12-inch, and eight 15-inch guns. The *Graf Spee*, on the other hand, is apparently of an improved type. She was recently referred to in the Vienna *Fremdenblatt* as an "Ueber-Schlachtkreuzer," or super-battle-cruiser, which suggests that she is a so-called "hush-hush" ship, of very high speed and great gun-power.—*The Engineer*, 26/7.

GERMAN LIGHT CRUISERS.—With regard to new light cruisers, the latest vessels of this type are said to be named *Mannheim* and *Köln*, the last-named commemorating the cruiser sunk in the Bight of Heligoland on August 28, 1914. Particulars of these vessels, which must be accepted with all reserve, show them to be of an entirely new design. The displacement is given as *circa* 6300 tons, the speed as 33 knots, and the machinery as geared turbines built at the Kiel Germania shops. They are officially designated "Hochseekreuzer," or ocean cruisers, and the design, if confirmed, marks a very distinct stage in German light cruiser development. Each of these vessels is understood to carry a battery of two 21-centimer and six 15-centimeter guns, with many smaller weapons, and four submerged tubes. The 21-centimeter guns are mounted at bow and stern respectively, the 15-centimeter guns being placed on the broadside. The boilers are fired with oil, of which a sufficient quantity is carried to enable the ships to steam nearly 12,000 miles at cruising speed. There is some light side armour, probably about 4 inches thick, the belt having a length of 320 feet, reinforced by the usual protective deck. It is instructive to compare this class with the *Graudenz*, the last light cruiser to be completed before the outbreak of war:—

	Graudenz	Mannheim
Length	456 feet.	520 feet.
Beam	45 feet.	49 feet.
Draft	16 feet	17½ feet.
Displacement	4900 tons	6300 tons.
Speed	27½-28 knots	33 knots.
Armament	Twelve 4.1-inch Q. F. Two torpedo-tubes.	Two 8.2-inch B. L. Six 5.9-inch Q. F. Four torpedo-tubes.

In this design the tendency of the light cruiser to merge into the cruiser, or even armored cruiser, is clearly marked. With the exception of the Dutch ships, *Java* and *Sumatra*—7100 tons—and the American vessels authorized in 1916, the *Mannheim* is the largest and most powerful ship of the cruiser type which is known to be under construction at the present time. If strength of armor is any longer a criterion, she should be placed in the armored cruiser category, since many of these vessels, such as the British "County" class, the German *Roon* and *Yorck*, and several old American and French "armored cruisers" had belt armor not exceeding 4 inches. In armament the *Mannheim* also compares very favorably with many pre-war armored cruisers. In more than one action fought during the present campaign, the necessity for heavy, long-range guns as bow and stern chasers has been clearly demonstrated. The 6-inch is apparently not powerful enough, and as in the German service, apart from the 17-centimeter (6.7-inch), which was a notorious failure, the next gun capable of accurate shooting at long range is the 8.2-inch, the adoption of this weapon as the main armament of the new cruisers will cause no surprise. The older model fired a projectile of 275 pounds with an initial velocity of 2785 foot-seconds, and a muzzle energy of 14,735 foot-tons, but in all probability the latest model has much higher ballistic qualities.—*The Engineer*, 26/7.

GERMAN SUBMARINE DESIGNS.—According to information which we believe to be reliable, the German submarines which have been molesting traffic off the United States seaboard for the past few weeks, do not appear to be vessels of any remarkable size. Their displacement is reckoned to

be about 1500 tons, and they have not shown themselves capable of travelling at a greater speed than 18 knots. Whether or not they belong to the so-called "submersible cruiser" type, we have no present means of determining; but our own belief, founded on a careful analysis of all the data available, is that the largest German submarines now in existence fall very far below the popular estimate. It has still to be shown that great size is an advantage in craft designed for underwater tactics. Indeed, the experience of the war suggests the contrary. A coastal boat of 500 tons may, in most circumstances, be quite as dangerous as one of thrice her displacement. It is true, of course, that certain qualities are conferred by large dimensions, such as a longer cruising endurance, a heavier armament of torpedoes and guns, and, what is no less important, superior living quarters for officers and men. But all these qualities may be obtained at the cost of a very moderate increase in tonnage. In a boat of 1200 to 1500 tons, let us say, it would be possible to provide fuel for a very long voyage, good living quarters and exercise space for the complement, and a powerful armament, including, besides torpedo tubes, a couple of heavy guns. Of one thing we may be pretty sure: the Germans are not building submarines any larger than is absolutely necessary. The policy they have elected to follow demands numbers rather than individual power, and unless we are much mistaken, their aim during the war has been to evolve a type of the smallest possible dimensions consistent with the function it is intended to fulfill. We know from Admiral von Capelle that a great deal of experimentation has been going on since 1914, and that the present German submarine flotilla so far from being homogeneous, comprises the most diverse types. In the recent debate before the Main Committee of the Reichstag, several speakers condemned the failure of the naval authorities to select some standard pattern of U-boat which would lend itself to quantity production. As one deputy complained: "Instead of taking this course, the Navy-office has preferred to build submarines in small groups, with the result that new designs are continually coming before the shipbuilders, and the rate of output is thus seriously decelerated." Replying to these criticisms, Admiral von Capelle admitted that progress in building submarines had not been entirely satisfactory, and that "from time to time" the strategical plans of his department had been affected by a shortage of the necessary *matériel*. As for the "standardized submarine," it, he explained, had not been adopted for the simple reason that it was impracticable. Scarcely a week passed without some valuable suggestion being made by experienced officers for improving the efficiency of U-boats in one direction or another. "Each of our present types," he said, "embodies lessons taught by the war. A boat that is considered highly efficient to-day may to-morrow be rendered more or less obsolete by a new discovery. If, therefore, we built our U-boats after a uniform pattern, we should run the risk of finding ourselves saddled with a large fleet of inferior boats. In spite of the astonishing progress it has made during the war, submarine navigation is still more or less in its infancy, and its development must be by gradual stages."

Even from the published version of this debate, it is clear that German submarine construction has not been so rapid as the outside world had assumed. Delays have, no doubt, occurred through lack of structure material, though we shall do well not to exaggerate the enemy's troubles in that connection. In our view, the real source of delay has been the difficulty of hitting upon a design small and simple enough to admit of rapid multiplication, and yet capable of fulfilling every tactical requirement. We venture to doubt whether German designers place high speed among the prime desiderata. The sort of work their submarines are called upon to do does not demand great speed, to obtain which other qualities of equal, if not superior, importance, must needs be sacrificed. Promptitude in submerging, for instance, is far more important; in that direction, we understand, notable progress has been made. The necessity

of extending the range of his boats was forced upon the enemy by the vigilance and strength of our patrols, which made the Narrow Seas too dangerous a hunting ground. By building U-boats with a large fuel capacity, he hoped to attack shipping in zones beyond the reach of the small patrol craft which form so large a section of our anti-submarine forces. Then, again, he was compelled to strengthen the armament of his submarines, in consequence of the heavier guns supplied to merchant ships. Therefore, unless a German submarine could bring equally heavy metal to bear, it would run the risk of summary destruction by the first armed merchantman it encountered. As we now know, the larger ocean-going submarines carry at least one 5.9-inch gun, an increase in armament which is their best title to inclusion in the cruiser category. Whether still heavier weapons will be found necessary remains to be seen. At the outbreak of war the largest gun mounted in enemy submarines was the 3.4-inch, then came the 4-inch, and later still the 5.9-inch. This great increase in the power of submarine armament is, of course, a tribute to the effectiveness of our defensive measures. The American ideal is to equip every large merchantmen with guns, which would enable her to fight a duel against any submarine afloat with a good chance of holding her own.

Reverting to the question of dimensions, one strong objection to the building of very large vessels is that their greater size does not seem to make them less vulnerable to attack. Depth charges, there is good reason to believe, are quite as deadly to large submarines as to small. If the former have armor protection, they may be better able to resist attack by guns of 4-inch and lower calibers, but it is most unlikely that they can carry armor stout enough to resist 6-inch projectiles. As for the ram and the torpedo, we know that both weapons have taken a heavy toll of the ocean-going raiders. One of the first German "submarine cruisers" was sunk recently by a British submarine on convoy duty. A single torpedo was discharged, the explosion of which, apparently, blew the hostile craft to pieces, for there were no survivors. On the whole, therefore, it is not easy to see what compensating advantage is to be gained by building submarines of very large size, and we may be sure that the Germans have not wasted their time and material in building many such vessels. One of their most successful designs, we understand, is the "UC" general service type, of which comparatively full details have been published. Upwards of 60 of these boats are stated to have been launched in 1915-16, and presumably others have been built since. The length is 170 feet, the beam 40 feet, and the displacement, when submerged, between 515 and 540 tons. On the surface a maximum speed of 15 knots can be attained, while the electric motors are good for 6 to 9 knots below water. The cruising endurance is not less than 3000 miles. The armament is composite, consisting of one 3.4-inch Q. F. gun and a machine-gun, three 20-inch torpedo tubes, and eighteen naval mines with dropping gear. As will be seen from the particulars, these are very formidable craft, in spite of their limited size, and the fact that so many have been built shows them to have demonstrated their all-round utility. From time to time unofficial reports in the press speak of "submersible cruisers" displacing about 5000 tons. For our part, we remain sceptical about the existence of vessels of such great size. The Germans may have built a few unusually large submarines, but for the reasons we have indicated it is most unlikely that they would have dissipated their none too extensive resources in the construction of vessels whose value is so problematical. Whenever full details of the German submarine building policy during the war come to be disclosed, we shall be surprised if it is not shown that a large majority of these craft were of comparatively limited dimensions. Probably 750 tons would be too high an average displacement for the whole German submersible fleet.—*The Engineer*, 2/8.

GERMAN MERCHANT MARINE.—The Shipping Board authorizes the following:

The Nordisches Kolonial Kentor (Northern Colonial Bureau, Limited) in Hamburg has issued a pamphlet entitled "German shipping before, during, and after the war," which contains valuable statistics. The German merchant marine amounted to 5,459,296 gross register tons on January 1, 1914. Shipowners have thus far direct and indirect losses of about 800 ships, with about 2,900,000 gross register tons, or more than 50 per cent.

If the ships still lying in neutral harbors are counted as lost as a precautionary measure about two-thirds of the entire German merchant marine would be done away with. In comparison with these losses the following table of new ships ordered by German steamship companies during the war is of interest:

Of the leading companies the Hamburg-American Line is building the *Bismarck*, with 56,000 tons, the turbine steamer *Tirpitz*, with 32,000 tons, and three other ships of 32,000 tons each in Hamburg yards. Near Bremen, nine steamers are being built, of which four, with a cargo capacity of 18,000 tons each, will be the largest freighters in the world. The Flensburg yard is building three large passenger and freight boats, while two other steamers of 13,000 tons each are in order.

Tecklenberg, Goestemunde, is building two cargo steamers of 17,000 tons each for the Panama Canal service. The Hamburg-South American Company has four cargo steamers being built at various yards aside from the *Cape Polonic*, an improved sister ship of the *Cape Trafalgar* (18,000 tons), new, sunk. The North German Lloyd is building two large liners, *Columbus* and *Hindenberg*, of 35,000 tons each, and two more ships of 12,000 tons each. The African Line is building six, the Hansa Line 12, and the Kosmos Line 10 steamers, ranging from 9000 to 13,000 tons.

According to the above the leading lines are building about 950,000 tons altogether, which is not nearly enough to replace the losses of the German merchant marine during the war. It was therefore necessary to encourage new construction by governmental measures. This purpose is served by the law regarding the reconstruction of the merchant marine recently passed by the Reichstag.—*Official Bulletin*, 22/8.

WORN OUT GERMAN GUNS.—The frequency with which German prisoners have complained of late that their front line was being exposed to the fire of their own guns, justifies the conclusion that German gunfire is deteriorating, particularly in the matter of accuracy. Loss of accuracy, other things being equal, is directly proportioned to the wear of the rifling, or erosion. Of all the causes which diminish the effectiveness of artillery, erosion is probably the most serious. The output of new guns, says a General recently from the western front, has not only to provide the numbers required to bring an army up to the desired strength, but it has to meet the wastage due to accident, to the enemy's fire, and to wear, and he tells us that the last cause of wastage completely overshadows the other two.

We have always known about erosion, which ever since the introduction of nitroglycerine powder has been the *bele noir* of the artillerist. It has taken the present war, with its enormous increase of the use of artillery, to prove how serious may become the wear of guns. Under modern conditions their life is very limited. In fact, experience on the western front has shown that, at the end of a single battle, some of the guns may be so worn as to have entirely lost their accuracy. Erosion, which has been serious even under normal conditions where the firing was more or less intermittent, has become extremely serious under present conditions, where field guns, such as the French 75, can fire as many as 15 to 20 shots a minute, and in cases of emergency may be called on to keep up that rate of fire for long stretches of time. Sustained rapid fire with full charges results in the guns becoming excessively heated. This is being met by the use of reduced charges and the enforcement of strict rules

calling for pauses, after a certain number of rounds, of sufficient duration to give the guns a chance to cool. Another palliative has been found in the greasing of the bore with specially prepared substances.

Now for the Germans the peril of this wearing out of the bore lies in the fact that they are extremely short of the raw materials for gun manufacture and particularly for the manufacture of liners or inner tubes. The supply of manganese is becoming a serious problem for the German gun manufacturers, and it is at least reasonable to suppose that the notable decrease in the volume and accuracy of German gunfire is due to the fact that their guns are wearing out faster than they can replace them. If this be so the German high command stands face to face with a stupendous problem; for the long-range shelling of back areas, particularly of shell dumps, cross roads, and concentration points; the silencing of batteries; and, above all, the exact placing and controlling of a creeping barrage, or for that matter, of any kind of barrage, all demand that the sights of the guns shall correspond with mathematical accuracy to the ranges actually covered by the shells. This loss of accuracy keeps pace with the wear of the riding of the gun and with the enlargement of the bore. Loss of accuracy is due both to the escape of gases past the base of the shell and to the failure of the worn rifling to impart the necessary speed of rotation to the projectile. The rapid wearing out of German guns is one among many contributory causes, which are slowly but very surely bringing the once seemingly omnipotent German army to its knees.—*Scientific American*, 14/5.

GREAT BRITAIN

THE NAVY'S WORK.—In his statement on the naval and military situation the Prime Minister, on Wednesday, gave some details about the work of the Fleet which should open the eyes of the nation. The burden of his address was, Thank God for the Navy. It is not as if the country has ever lost its confidence in its seamen—far from it—but owing to the extreme reticence which has found favor in official quarters, only a very vague notion has obtained of what has been, and is being, done by them. A general impression prevails that the Grand Fleet makes periodical cruises in the North Sea, and that its auxiliaries are engaged in fighting the submarine and the mine, but beyond this sketchy view of naval activity the outlook of the man in the street seldom reaches. Mr. Lloyd George by his handsome tribute has now widened the area of the people's vision, and by means of the facts and figures presented in his speech should have brought home to the imagination of everyone the vast and arduous task with which the seamen have so skilfully and successfully grappled. It has not been without ample reason that the navy's tonnage has been increased during the four years of war from two and one-half to eight millions. When the Grand Fleet left Portland for the Northern Mists to take up its ceaseless vigil, our naval strength was relatively nearly half as much again as that of the enemy, blut the work which devolved upon it increased by leaps and bounds, and it became essential that its expansion should proceed on similar lines. A novel and almost unexpected nature of warfare, waged with the utmost ferocity and deadliness, required an equally novel form of naval force to counter it, and thus the auxiliary service, which has run into thousands of vessels of all kinds, was created. The mercantile marine "in being," as well as that which is in process of construction, has become a branch of the Navy. The protection of the military forces afloat and the carriage of their reinforcements and equipment has necessitated the use of thousands of tons of shipping, while the protection of these transports and supply vessels has obliged the patrol of the ocean routes by swarms of armed ships of all classes. Against the menace of the enemy's stealthy and silent under-water attack the Navy has offered a deadly offensive and has shattered his hope of winning therewith a decisive victory at sea. What would have been the situation to-day but for the incalculable service rendered by Britain's seamen?

Mr. Lloyd George said that the naval officers from the United States were especially anxious that America should be made to realize the gigantic task the British Navy had undertaken. It is essential to the success of the cause of the Allies that not America alone, but all the world, and particularly the enemy peoples, should learn the truth about this subject. It may require some effort of imagination to grasp the immensity of an undertaking which needs the movements of the ships of the Navy over eight million miles in one month alone. Multiply this by the number of months we have been at war and add to it the distances covered by the vessels of the merchant marine, and the result is astounding. It is not surprising that the *personnel* of this vast armada has also grown enormously when the number of ships and the world-wide enterprise in which they are daily and nightly engaged is grasped. The struggle is ceaseless, but its end is sure. The submarine has been beaten at two points. The Navy has mastered it at sea and the shipbuilders have defeated it on land. The toll of loss diminishes on the one hand and the output of tonnage has outstripped destruction on the other. The British Navy and its Allies afloat have made possible success on land by foiling the enemy's sea offensive and safeguarding the troops of America across the Atlantic. It may seem to some that the estimate of the Prime Minister as to the number of submarines destroyed is disappointing, but the uncertainty which attends the operation must be considered. As Mr. Balfour once said, it is difficult to make assurance sure. Only the Germans know precisely how many submarines have not returned to port, and no better evidence of the casualties is needed than that given by the failure of the submarine campaign. It is well that the Prime Minister showed both friends and foes that unless the Allies had been completely triumphant on sea at the outset, no effort on land would have saved them. The predominance of the Navy has been the winning asset from the start. Why hide its light when it has been a shining example to all? Upon the issue of the sea struggle the fate of the war depends.—*Army and Navy Gazette*, 3/8.

THE NAVY AND MERCHANT SHIPBUILDING.—It is not inappropriate that the return of merchant shipping construction for July, with the accompanying statistics, which enable comparison to be made over a long period, should have been made public simultaneously with the review of the war situation contained in the speech of the Prime Minister. It is true that Mr. Lloyd George, while warning the nation against false confidence, gave chapter and verse for the hopeful tone which was the prevailing note of his speech. His tribute to the work of the Navy in denying the enemy the use of the seas, save in the furtive cruises of the U-boat fleet, the announcement that no fewer than 150 of these ocean pests have been destroyed, his claim that upon the issue of the naval war depends the final result of the world conflict, constituted a timely reminder to the unreflecting of the magnificent work done by the allied naval forces, of which the British Navy has borne the brunt. There were, however, one or two statements in his speech which should be read in conjunction with the return of merchant ship construction for last month as well as for preceding periods. He pointed out that the tonnage of the navy, including the auxiliary fleet, had increased during the war period from 2,500,000 to 8,000,000 tons. It is well that critics of the merchant shipping output should have in mind not merely the tremendous effort involved in making that addition to our naval resources, but, as Mr. Lloyd George told the House of Commons, the concurrent claim on our shipbuilding and other industries in repairing, supplying and maintaining that great war machine. The same point was recently made by Sir Eric Geddes in the course of the shipbuilding debate. In an interview which he granted to a number of representatives of the press yesterday afternoon, Lord Pirrie explained much that has hitherto been obscure. For example, he pointed out that the present distribution of effort was in the following order,—the section

with the largest number being shown first: (1) Repairs and refits, both merchant and naval; (2) new naval construction, including auxiliary vessels; and (3) new merchant construction. There could, he said, be no question as to repairs taking precedence, and went on to assert that so long as there was a single ship to repair he did not propose to draw men off for new construction. The distribution of the balance of labor between naval and merchant construction was, he added, a matter which was settled by the First Lord, and with a knowledge of all the circumstances and in view of the fact that the net monthly losses of merchant shipping were decreasing,—they reached their highest point of nearly 500,000 tons in April, 1917, while during May and June of this year they were only in the neighborhood of 27,000,—he—Lord Pirrie—was in perfect agreement with him on the question. Then with regard to the withdrawal of additional men from the fighting line, Lord Pirrie further explained that most of the skilled shipyard workers had now become skilled soldiers, and were as indispensable to their new profession as to their old industry, and that, having regard to the present military situation, he did not feel that he had, at the moment, a strong enough case to take to the War Cabinet demanding the return of these men. It was made perfectly evident, however, that all the Government Departments concerned are dealing with the question of merchant and other shipbuilding in a manner which, as far as can possibly be foreseen, will bring about the best results obtainable, having regard to all the circumstances.—*The Engineer*, 9/8.

BRITAIN'S PRESENT MERCHANT TONNAGE.—The British mercantile tonnage at the outbreak of the war amounted to 18,500,000 tons gross, and the figure at the present time is 15,000,000 tons gross, Sir Leo G. Chiozza Money, Parliamentary Secretary to the Ministry of Shipping, announced in the House of Commons last week.—*Naval Gazette*, 17/1.

BRITAIN BUILDING MORE CARGO SHIPS.—*Admiralty Frees Men Engaged on Naval Craft.*—Baron Pirrie, controller general of merchant shipbuilding, during an interview to-day, gave some of the impressions he had gained in his recent tour of the shipyards on the Tyne and generally reviewed the situation with regard to the merchant shipbuilding program. He said he had been much gratified with the general position as he had found it, and continued:

"Considerable progress has been made with the construction of new private yards and extensions as well as with the installation of necessary plants and labor-saving devices.

"We are receiving the co-operation not only of organized but of individual labor in connection with the use of labor-saving devices and other contributory causes of the improved output. Forty-nine yards are now being solely engaged on cargo shipbuilding and every month the number is increasing.

"The combined results of new merchant construction, merchant ship repairs and the official operation of shipping by the shipping controller has improved service to and from this country by 22 per cent since January last.

"The necessity for anti-submarine craft has hitherto made such demands upon the shipbuilding resources of the country as seriously to restrict the output of merchant ships.

"As a result of my representations the First Lord of the Admiralty now has agreed to transfer a large number of men from naval to merchant construction, which will give great impetus to merchant shipbuilding. I must, however, give warning that here again we cannot give immediate results and it will be some little time before the effect of his additional labor will be reflected on actual deliveries of merchant ships.—*Washington Post*, 8/9.

AUSTRALIAN CRUISER LAUNCHED.—The Australian cruiser *Adelaide*, built entirely of Australian materials and by Australian labor, has been launched recently at Melbourne. She is one of several warships built by Australia and now in service.—*Naval Monthly*, September.

NEW DRY DOCK AT QUEBEC.—The recently-made announcement that the new dry dock at Quebec, which has been under construction since the year 1914, is now practically completed, directs attention to a project of considerable importance. Until now, although it has been possible for the port of Quebec to receive the largest ships afloat at the deep water berths which have been provided at the breakwater and one of the piers, the graving dock accommodation was behind the requirement of vessels frequenting the port. The largest of the previously existing dry docks, that is Levis, is 600 feet long, with a breadth of 62 feet, but at high water of neap tide it has a depth of only 20 feet 6 inches over the sill. The new graving dock, which is known as the Champlain Dry Dock, and which has been constructed on the south side of the St Lawrence, is 1150 feet in length, 120 feet wide, and has a depth over the sill of 34 feet at neap tide and 40 feet at high water of spring tide, dimensions which made it one of the largest in the world, and should meet the needs of vessels trading to Quebec for many years to come. The dock is divided into two compartments, an inner chamber 650 feet long, and an outer one 500 feet in length. The outer entrance is closed by a rolling caisson, and the middle entrance by an ordinary floating or ship caisson. The outer section of the dock is filled through six culverts in the outer caisson, each having a sectional area of nine square feet, but there are two culverts of 30 feet section in each side wall. The middle entrance has a similar arrangement of culverts. For emptying the dock three main pumps of the horizontal centrifugal type, designed to deliver 63,000 gallons a minute, against a total head of 25 feet, have been provided, and two auxiliary pumps, each having a capacity of 6000 gallons per minute, have been installed to deal with leakages and seepage. Electric power is supplied by three direct-current 550-volt Curtis turbo-generators, having a total capacity of 2550 kilowatts. The time required to fill the dock may extend up to four hours, but it is estimated that the pumping plant will empty the dock in about 2½ hours.—*The Engineer*, 2/8.

A WATERWAY ACROSS ENGLAND.—A letter from Mr. W. J. Botterill, in the current issue of the *Field*, proposes the construction of a great waterway across England from the North Sea to the Bristol Channel, and from Oxford to Birmingham. This canal would be provided with several docks, and the canal itself would be capable of taking vessels as heavy as those which use the Manchester Canal. Mr. Botterill asserts that there has been great congestion at our docks since the war began, and suggests that there may be even worse confusion after the war when thousands of great ships are in competition. With the 300 miles of waterway and many docks he proposes, the writer believes that England could hold her own against the world. He also outlines a project for the formation of a great naval base on one of the Norfolk Broads, near Norwich, which would be extended to cover about 400 acres. As in the cases of the projects for the Forth and Clyde Ship Canal and several others of the same kind, this plan has many good points which become specially manifest in time of war, therefore the proposal should be regarded from a military as well as a commercial standpoint. This is, however, hardly the most favorable time for the discussion of such undertakings, with the caution and deliberation which must be necessary, and while general interest must be felt in such matters it is doubtful whether the authorities are inclined to give due consideration to them. There can be no question that a naval base in the eastern counties as indicated in Mr. Botterill's letter, capable of taking large fleets, would be a great advantage, although it is essential that such a base should be of

easy access to the sea. The disadvantages of a port with only a canal connecting with the open water is illustrated at Zeebrugge. As in the case of the Forth and Clyde Canal, the benefits arising from such an undertaking are obvious, but the question arises as to whether these are commensurate to the cost.—*Army and Navy Gazette*, 5/8.

OIL FUEL FROM BRITISH SOURCES.—The report[1] of the committee appointed by the Minister of Munitions to consider the possibility of substantially augmenting the production of oil fuel from British sources is distinctly disappointing. A previous report submitted by the Petroleum Research Department had raised our hopes as to the possibility of obtaining, by the distillation of cannel coal, a material addition to our imported supplies of this now indispensable commodity. In fact, the last-named committee had proposed to establish forthwith over a hundred batteries of retorts specially designed for extracting their oil content from cannel coal and kindred materials. Each battery of retorts was to be capable of dealing with 100 tons of the raw material per diem.

The Ministry of Munitions agreed, and the present report ratifies the wisdom of the decision, to erect at Nottingham a battery of these retorts capable of handling 50 tons of cannel per day; but before venturing on the larger scheme appointed another committee to re-investigate the question, taking into account other factors than those connected with the purely technical aspect of the question. Technical questions remained, however, of prime importance, and engineers will be relieved to learn that although not officially constituted a member of their body, the committee had throughout their inquiry the assistance of Sir George Beilby, whose competence in the matter under review is incontestable. Greater weight will accordingly be accorded to the finding of the report than would otherwise be readily conceded to the views of a body of which so large a proportion of the members were either mere politicians or departmental officials.

The recommendations of the Petroleum Research Committee are dissented from on several grounds. In the first place, it is stated that instead of a daily supply of some 12,700 tons of cannel coal being available, the present output does not exceed 2000 tons a day, practically the whole of which is sold either mixed with other classes of coal, or is sent to gas works for enrichment purposes. With respect to that portion which is now sold mixed with other coal, the committee are advised that the labor which would be required to sort it out is not now available. Indeed, any increased output of cannel coal would, as matters stand, necessarily involve a reduction in the output of ordinary coal, and this reduction of tonnage would be greater than the increase in the output of cannel, since cannel coal is not only harder than ordinary coal, but occurs generally in thinner seams, so that the output per operative is materially reduced. The committee agree that considerable supplies of cannel or kindred materials are incorporated in the spoil banks at many pit heads, but they are convinced that under present conditions of labor this source of supply is unworkable. A further objection taken to the ambitious scheme of the Petroleum Research Department is the cost of the plant. The Nottingham battery designed to deal with only 50 tons per day will cost £25,000, so that the expenditure on the complete scheme would run into millions, and even so the total additional supply of oil fuel would meet but a small fraction of our annual requirements. Of course, even a small addition to the supplies of a commodity may effect more than a proportionate reduction in the average market price, but under present conditions the circumstance that the vast bulk of our requirements must, in any case, be met by imports does add additional weight to other arguments against proceeding further with the scheme of the Petroleum Research Committee. The difficulty of securing the

[1] Production of oil fuel from home sources. H. M. Stationery Office. [Cd. 9128.] Price 1*d*.

necessary labor would in itself be practically decisive. One argument advanced by the committee does, however, seem open to objection. They submit that although the Chiswick type of retort has worked most satisfactorily under expert supervision, it may give trouble if the attempt be made to operate it without such assistance. This contention naturally leads to the query as to why such an attempt should be made? The circumstance that in the past many British industrial undertakings have prided themselves on "not having a scientific man in the place" seems insufficient warrant for continuing the disastrous tradition, and if the Chiswick retort can be operated only under scientific direction it would surely be better to abandon a pernicious precedent than a promising industrial process.

An alternative to the scheme of the Petroleum Committee is to increase the production of oil at town gas works, since it has been proved that the ordinary vertical retort can be operated so as to efficiently extract the oil from cannel. The modifications necessary would require relatively little expenditure of time or labor. Nevertheless the committee express themselves as adverse even to this scheme for increasing our native supplies of oil fuel, in view of the difficulties involved in an increased output and transport of cannel coal. In short, they hold that the attempt to increase our supplies of oil by carbonising home produced materials would involve serious interference with other essential industries.

In other circumstances, with transport less congested, and ample supplies of labor available, some of the drawbacks advanced by the committee will no longer apply. In fact, they report that it should be possible to obtain from every 20,000,000 tons of coal consumed in the country, 1,000,000 to 1,250,000 tons of fuel oil. In 1915 it appears that the home consumption of fuel was not less than 193,000,000 tons, which, on the committee's figures, should, under appropriate treatment, be capable of yielding about 10,000,000 tons of fuel oil. Other by-products would also be available, but, of course, the capital expenditure involved would be very large, and in the present temper of public opinion it seems certain that Parliament would use its best endeavors to compromise the success of any undertaking of this kind by restrictions designed to prevent enterprise and ability from receiving an adequate reward. Economic materialism has been too long an established creed in this country to be readily uprooted, and promises to seriously handicap the nation in the industrial developments which will be essential to the liquidation of our enormous war debt.—*Engineering*, 9/8.

THE SUPPLY OF MERCHANT SEAMEN.—The announcement during the past month of a strong committee, under the chairmanship of Sir Norman Hill, to which has been entrusted the task of making recommendations to the Board of Education as to the lines which a national scheme of training for the mercantile marine should follow, is a welcome indication that the authorities are giving attention to this very important subject. It is essential not only that steps should be taken by the better organization of shipbuilding to repair the serious wastage of our merchant fleet, but that a concurrent attempt should be made to ensure an adequate supply of British seamen to man these vessels, and the announcement that a body of recognized experts is engaged in framing an education scheme for boys who may desire to enter the merchant service will serve to direct the attention of parents and others interested to the excellent opportunities of advancement now open to those who decide to follow such a career, whether in the higher or lower ranks. The address which Sir Thomas Sutherland delivered a few days ago to the cadets of the Thames Nautical Training College, one of the sources from which officers in the mercantile marine are obtained, was a further timely reminder of the need of providing additional education facilities for those who intend to enter the industry on which the future prosperity of Great Britain so largely depends. In addition to that of the Board of Education, this question has also attracted the attention of the Local Government Board, and the

circular which has been sent from that Government Department to Boards of Guardians will, it is hoped, have some effect in arresting the decline in popularity of sea service among boys coming under the control of these boards, which has been apparent for some time past. It is hoped that the publicity which has now been given to the subject will have the desired effect of ensuring that the requisite supply of young seamen is available after the war. Quite apart from the need of manning the merchant service with those of British birth, the scheme of training which is now being framed will, it is hoped, be the means of preventing a large number of boys from being lured by the spell of high wages into blind alley occupations at a period when they should be educating themselves for a permanent career.—*The Engineer*, 2/8.

NAVAL PRIZE MONEY.—The English are about to adopt a scheme of awarding prize money to officers and men of the Navy. In explaining the bill in the House of Commons, Dr. McNamara explained that prize money was entirely different from prize bounty. The former is awarded for capture of enemy merchant ships and cargo out of the proceeds of sale, while the latter is a grant by the state of a certain sum per head in respect of enemy ships sunk or captured to the officers and men taking part in the sinking or capture.

Down to the present war the award of prize money has been made to the crews directly engaged in the capture of the prize, but a more general scheme of distribution is now considered advisable. The net proceeds of prizes are to be placed in a pool, out of which officers and men of the fleet as a whole taking part in the operations of the war will participate. It will be necessary to postpone the final distribution until the close of hostilities.

Dr. McNamara gave the following statement concerning the proposed measure:

To qualify for a full share, each individual officer and man must have completed 30 months of sea service in a sea-going ship. Should the war last more than double that length of time a longer period of sea service would be required and an amending proclamation would be issued. If the sea-going service of an officer or man were less than 30 months he would receive a proportionate amount of a full-share. In no case would any portion of a share be allotted unless the individual had given at least one month's sea service. Relatives of men who had lost their lives and men who had been invalided with wounds would receive a full share irrespective of their total period of service at sea. It was proposed to treat prisoners of war with special consideration. The scale of distribution would be based as far as possible on an estimate of the relative responsibility of the various ranks and ratings. Under the old scale of distribution, before those eligible to receive awards were allocated their shares, a certain proportion of the prize money was taken out for flag officers and those in command. For example, on the occasion of the last distribution, flag officers took one-thirtieth of the total sum available and commanding officers took one-tenth of the whole fund if there was no flag officer there. Under the present scheme every one, from the lower deck to the commander-in-chief, would come on to the fund for his share without any such deduction having been made from the total amount. The opportunity had been taken to recognize the importance of the services rendered by the engineering officers in charge of the larger ships. The bill provided that any accumulation of interest on the money in the hands of the prize courts should be added to the fund with regard to prize ships which had been taken into use for the conduct of the war or for the purposes of trading to meet the necessities of the civil population. It had been decided that it would be equitable to credit the naval prize fund with the value of such ships at the time they were taken over and to allow compound interest at the rate of 4 per cent until the money was paid over to

the fund. Interest at the same rate would be paid on the value of goods condemned as droits of the crown which were sold. In certain respects the government were improving the machinery in the interest of the fleet. The deduction of 5 per cent formerly taken by the treasury from the profits before their distribution would no longer be made. It had also been decided that the employment of ships' agents was no longer necessary. As regards bounty, it was thought equitable to allow not exceeding 1 per cent to the ships' agents in lieu of the 2½ per cent previously claimed. Claims would be coming in for years, and it was proposed that after the main distribution had been made the "sweeping up" which would in the aggregate amount to a considerable sum, should be devoted to naval charitable purposes. Officers and men belonging to his majesty's dominions outside the United Kingdom who had contributed so loyally and materially to the success of our operations would share in the distribution of prize money to the same extent as the royal navy.

Scale of Distribution.—The draft proclamation granting prize money to the fleet and regulating its distribution provides that the distribution is to be made so that each officer and rating entitled to participate shall receive shares according to his class as set forth in the following scales:

Special Classes	Shares
Commander-in-chief, grand fleet	2,000
Admiral commander-in-chief	1,250
Admiral commanding a squadron	1,000
Vice-admiral commander-in-chief	1,000
Vice-admiral commanding a squadron	750
Vice-admiral	500
Rear admiral commander-in-chief	750
Rear admiral commanding a squadron	500
Rear admiral	300
Commodore, first class, commander-in-chief	750
Commodore, first class, commanding a squadron	500
Commodore, first class	250
Commodore, 2nd class, commanding a squadron	250
Commodore, 2nd class	160
Captain in command, first 80 on list	160
Captain in command, second 80 on list	130
Captain in command, remainder of list	100

First class: Commander in command, 60 shares.

Second class: Captain not in command and officers of equivalent rank; commander serving as second in command in a ship commanded by a captain; engineer commander in charge of the engines of a ship commanded by a captain; and lieutenant commander in command, 40 shares.

Third class: Commander not in command and officers of equivalent rank; lieutenant commander serving as second in command in a ship commanded by a captain; engineer lieutenant commander in charge of the engines of a ship commanded by a captain; and lieutenant in command, 30 shares.

Fourth class: Lieutenant commander not in command and officers of equivalent rank; lieutenant serving as second in command in a ship commanded by a captain; and engineer lieutenant in charge of the engines of a ship commanded by a captain, 25 shares.

Fifth class: Lieutenant not in command and officers of equivalent rank, and sub-lieutenant, mate, or commissioned warrant officer in command, 20 shares.

Sixth class: Sub-lieutenant not in command, mate, commissioned warrant officer, and officers of equivalent rank, and warrant officer in command, 15 shares.

Seventh class: Warrant officer, royal navy, and equivalent ranks, and royal marine gunner, 12 shares.

Eighth class: Midshipmen, clerk, chief petty officer, warrant officer of marines, staff and color sergeant of marines, and equivalent ranks and ratings, 10 shares.

Ninth class: Naval cadet, assistant clerk, petty officer, petty officer first class (O. S.), sergeant of marines, and equivalent ranks and ratings, 8 shares.

Tenth class: Petty officer second class (O. S.), leading seaman, corporal and bombadier of marines, and equivalent ranks and ratings, 6 shares.

Eleventh class: Able seaman, private, gunner, and bugler of marines (after training), second head krooman, second tindal, and equivalent ranks and ratings, 5 shares.

Twelfth class: Ordinary seaman, boy, private, gunner, and bugler of marines (before completion of training), and equivalent ranks and ratings, native seamen and stokers, 3 shares.

Thirteenth class: Supernumeraries (except as provided in regulation 13) and canteen staff, 2 shares.—*Army and Navy Register*, 24/8.

GREECE

GREECE LACKS SHIPS.—*Has 200,000 Troops Under Arms, Could Have 100,000 More.*—Greece has now 200,000 troops under arms, and could raise an additional 100,000 if it were not handicapped by the lack of shipping facilities, according to a statement made to-day by Michael Acopoulos, the Greek Minister of Agriculture. Construction of shipyards has been begun to meet the need for tonnage.

M. Acopoulos declared the Saloniki front is far more important than is generally realized, and he predicted that there will be important developments there soon.—*Washington Evening Star*, 17/9.

ITALY

THE "BENEDETTO BRIN" TRIAL.—In the course of the recent trial, at Rome, of four men accused of complicity in the blowing up of the battleship *Benedetto Brin* at Brindisi, in September, 1915, evidence was adduced which proved beyond all doubt the existence of an organization, financed from Austria, and probably from German sources as well, the task of which was to destroy warships, arsenals, munition factories, etc. Very soon after the *Brin* was blown up, rumors of foul play came into circulation, but for reasons now obvious they were not encouraged by the authorities, who lost no time in instituting a searching inquiry. It has taken nearly three years to probe the conspiracy, but it is gratifying to learn that the men who actually carried out the work are to meet with just punishment. Whether the real authors of the plot—for the four men convicted were apparently humble instruments—can be apprehended, is more than doubtful, but it is certain that the Italian authorities will not rest until they have stamped out this hidden menace to the safety of their fleet. The *Benedetto Brin*, though she was launched at Castellamare as far back as 1901, was a powerful and useful battleship, especially for service in the Adriatic. She was 426½ feet in length, and displaced 13,214 tons. Her engines developed 20,400 horsepower, giving a speed of 19.5 knots. Belleville boilers were fitted. For a battleship the armor protection was light, being limited on the water-line to 6 inches, but the main gun positions had 10-inch armor. Four 12-inch guns constituted the main battery, in twin turrets. There were also four 8-inch mounted at the angles of the redoubt, and twelve 6-inch Q. F. in a main deck battery. The *Regina Margherita*, a sister ship launched at Spezia in 1901, was mined and sunk in the Adriatic in December, 1916. In August, 1916, the Italian Navy lost the *Leonardo da Vinci*, one of its finest all-big-bun ships, under circumstances suspiciously akin to those attending the *Benedetto Brin* disaster. According to the official account.

a mysterious fire broke out in the vessel while she was lying in the harbor at Taranto, and in spite of great heroism displayed by the crew, the flames reached the magazines. Hopes were entertained that it might be feasible to raise and repair this ship, but nothing has yet been made public as to the progress of the work.—*The Engineer,* 16/8.

ITALY'S WAR LOSSES LESS.—According to a Rome dispatch, during the April-June period of 1917, when Italy's losses of tonnage were the heaviest, 17 vessels were lost in April, 10 in May, and 10 in June. The losses during the corresponding quarter of this year were reduced to eight, four, and two, respectively.—*Nautical Gazette,* 16/8.

ITALY'S TONNAGE CONTRIBUTION.—In spite of limited facilities Italy has contributed this year 125,000 ship tons to the Allied facilities available for the war, according to official dispatches received here. Since the submarine menace developed there have been 15 new shipyards completed, and seven more are in course of construction.—*Nautical Gazette,* 9/7.

JAPAN

JAPANESE SHIPBUILDING.—M. Ernest Outrey, Deputy for Cochin-China in the French Chamber, an acknowledged authority on Japanese affairs, has (in the *Echo de Paris* of July 9) recently described an extraordinary development of shipbuilding now proceeding in the Island Empire of the Far East. The German submarine campaign *à outrance,* besides bringing the United States into the camp of the *Entente,* gave an immense impetus to shipyard construction throughout the world among the Allies of England. The percentage of the world's tonnage constructed by Japan before the war was 2 per cent. In 1916 it was nearly 10 per cent. The number of shipbuilding yards in 1917 had been increased from 9 to 29, and the estimated output in ships for the present year is 98 of a total tonnage of 610,000 tons. The new Tsurumi yards furnish a remarkable example of the extraordinary activity and enterprise prevailing among Japanese shipbuilders. In November, 1916, nothing had been done there beyond the work of drying and draining the land. In June, 1917, workshops covering an area of 200 acres were either completely finished, with machinery in place, or nearly so, with machinery ready at hand. The first ship of 11,000 tons was launched in July, 1917, and three others of the same tonnage were building. There were ten slips for ships of 10,000 to 12,000 tons and two for ships of 30,000 to 32,000 tons. All the necessary measures had been taken for turning out 30 of the former in the course of one year.—*Army and Navy Gazette,* 3/8.

NORWAY

TO PAY FOR NORWAY SHIPS.—A dispatch to the Exchange Telegraph from Copenhagen says that the German Government, replying to Norway's protest against the sinking of Norwegian government ships outside the danger zone, has declared it will compensate Norway should that country prove the ships were sunk without warning.—*Washington Evening Star,* 28/8.

PERU

PERU ADOPTS UNITED STATES ARRANGEMENT TO USE GERMAN SHIPS.—Congress to-day approved an arrangement reached between the Peruvian and American Governments for the use of the German vessels interned at Callao.

Eight German vessels which were interned at Callao were taken over by the military forces of Peru last June. They include several large steamers, with passenger accommodations, formerly plying between San Francisco and South American ports and German ports.

When Peru broke off relations with Germany in October, 1917, the Peruvian Congress gave to the President authority to utilize the German ships if the national necessity demanded it.

SPAIN

SHIP FOR SHIP.—*Spanish Note to Germany.*—The Ministry of the Interior has communicated to the press the text of an official Note dealing with the torpedoing of Spanish vessels which has been drawn up by the Council of Ministers and was sanctioned to-day at San Sebastian. The Note is as follows:

Recent Cabinet meetings in Madrid have been concerned with the international situation. In consequence of Germany's submarine campaign a number of Spanish vessels, representing 20 per cent of the entire Spanish mercantile marine, have been sunk, and more than 100 of their crews have perished, quite apart from the large number of men wounded, and the painful fact that on repeated occasions men deprived of their ships have been left to their own resources and that at great distances from the coast. It has even happened that vessels requisitioned by the government, conveying merchandise of prime necessity for the country and intended simply and solely for Spanish consumption, have been torpedoed without the least pretext.

In view of the great and serious difficulties for navigation created by a situation which is highly prejudicial to the material interests of Spain, and which is at variance with that respect for international law to which Spain is entitled for the loyal and chivalrous manner in which she is performing her duty as a neutral Power, the government has considered that it cannot, without gross neglect of its most primary duties, omit to take measures, within the limits of neutrality, to guarantee the maintenance of Spain's maritime commerce, and to protect the lives of her subjects when at sea.

In face, however, of the uselessness of her repeated protests she has decided to approach, in the same friendly spirit as hitherto, the Imperial Government, and to inform it that the reduction of our tonnage to the minimum limits of our most pressing requirements and our design to secure for our merchant vessels only the protection afforded by our flag and by the centralization under government direction of the entire mercantile marine would compel it, should a fresh case of a Spanish vessel being torpedoed occur, to replace the Spanish tonnage sunk by that of the German ships anchored in Spanish harbors. This measure, which is dictated only by necessity, in no way implies the definite confiscation of the German ships, but would amount only to a temporary expedient which would, along with innumerable other Spanish claims, be settled when peace comes to be negotiated.

In pursuance of this object the appropriate instructions have been sent to our Ambassador in Berlin for the information of the Imperial Government. The Spanish Government feels assured that Germany will allow full weight to the circumstances which have led to our decision and will recognize it as being in accordance with the loyal neutrality which we have observed since the beginning of the war. The decision is but in the natural and obligatory defence of the essential interests of Spain, who is still sacrificing many of her just rights and conveniences, but cannot further risk prejudicing the national dignity and life.

The resolve of the government to secure for Spain the use of the tonnage, which is indispensable for her life, in no way affects her firm intention to maintain the most strict neutrality of the country, or prevents her from observing towards the German Government all the respect and consideration which is due to it. Spain in her turn expects to receive from Germany the amicable treatment in regard to which she already considers herself on several grounds a creditor.—*Reuter, London Times,* 22/7.

GERMAN STEAMER SEIZED BY SPAIN.—The Spanish Government after a cabinet meeting Saturday night seized one of the interned German steamers, according to a Madrid dispatch to the *Daily Mail*. This action was taken because of the torpedoing of the *Ataz-Mendi*.

The Spanish Government to-night decided to take over all the German steamships interned in Spanish ports in accordance with Spain's recent Note to Berlin, because of the torpedoing of Spanish vessels by German submarines.

Foreign Minister Dato announced at a meeting of the cabinet to-night that the Spanish steamship *Ataz-Mendi*, carrying a cargo of coal from England to Spain, had been torpedoed and sunk by a German submarine.

A semi-official Note issued after a meeting of the cabinet to-day says that the Minister of Foreign Affairs informed the cabinet of the sinking of the Spanish steamer *Carasa* on August 22, and that he had asked the Spanish consul at Cardiff, where the survivors were landed, to telegraph full details of the sinking.

The Minister of the Interior gave the cabinet the names of certain newspapers which had refused to obey the censorship. The Minister was instructed to appeal to the patriotism of these papers and to apply the law strictly if they were unwilling to listen to his advice.

A dispatch from Paris August 29, reported the sinking of the Spanish steamer *Carasa* of 2,099 tons gross by a German submarine. The date of the sinking was not given in the dispatch.—*Evening Star*, 2/9.

IF SPAIN WENT TO WAR.—The sharp diplomatic exchanges between the Spanish and German Governments seem to have resulted in a settlement that is satisfactory to both countries. The situation, however, is pregnant with danger, as indeed is any situation where German good faith is concerned. If the Germans believe that the tide is turning against them in Europe Spain is not likely to be brought into the war; but should German arms be able to stop the progress of the Allies in the West, and particularly should they reverse the present conditions by winning an important victory, we may be sure that Germany will not view with complacency the taking over of her interned ships by the Spanish Government. In any case, it is of interest to estimate what accretion of strength Spain could bring to our cause if she threw in her lot with the Allies.

Her chief contribution would be largely negative, inasmuch as Germany would lose one of the most fruitful fields for her insidious propaganda. Also, and this would be a very positive gain, the task of hunting down and curbing the activities of the U-boats would be measurably lightened. The three-mile limit around the extensive coast of Spain would no longer offer immunity to the hard-pressed German submarines. They would be shut out of her harbors and instead of a too complacent and very questionable neutrality, Germany would be faced by the active opposition of such units of the Spanish fleet as are available for anti-U-boat service. The most important ships in the Spanish Navy are three small battleships completed in 1914 and 1916, which are dreadnoughts in everything but size. These ships are of about 16,000 tons displacement and mount eight 12-inch and twenty 4-inch guns, the heavy guns being protected by 8- and 10-inch armor. The belt is 8-inch, and the speed of the ships on trial was about 20½ knots. Outside of these vessels, the Spanish Navy, so far as its larger ships are concerned is pretty much what it was in 1898; but even at that it includes some vessels like the 7,500-ton protected cruisers *Asturias*, and *Cataluma* and the *Reina Regente*, which might be used as mine layers or as mother ships.

In her gunboats and trawlers, Spain possesses a fleet that would be of material service in the Mediterranean for mine sweeping and patrol work. There are about 30 of these, which would be useful in keeping clear the entrances to her ports and the passage through the Straits of Gibraltar.

Also the fleet includes some half dozen destroyers of from 400 to 450 tons displacement, which have a signed speed of 28 to 30 knots. These boats were built some twenty years ago.

Exceedingly valuable for patrol work in the Mediterranean would be the 30 or 40 torpedo boats of a little under 200 tons displacement and 26- to 31-knot speed, which have been built during the past few years for the Spanish Navy. The torpedo boat has come into its own for patrol work off shore and in the more sheltered waters.—*Scientific American*, 14/9.

BRITISH INTERESTS IN SPAIN.—A full investigation of the facts concerning the internment in this port of the German submarine *U. C.-56* reveals a state of affairs which is none the less scandalous for being typical of the way in which Allied interests are being muddled and neglected in Spain. The following are the facts:

The submarine came in to Santander on the morning of May 21 under her own power, her engines being observed to be working freely ahead and astern. She was immediately taken charge of by the port authorities, and an armed guard put on board pending an official examination. She carried no torpedoes, but was fitted as a mine-layer. Her captain is Commander Reisser, formerly chief officer of the Hamburg-Amerika liner *Spreewald*, and be it well noted, extremely well acquainted with this part of the Spanish coast. He made several statements as to his movements and his reasons for coming in; but as one of these statements was that he had left Zeebrugge on May 12, the truth of the remainder may be regarded as, to say the least, doubtful. Engineer-Inspector Don Joachin Concas, of the Spanish Navy, made a thorough inspection of the vessel and also directed the removal of such essential parts of her machinery, including all spare parts, as would make it impossible for her to be moved under her own power. She was then, on May 28, towed round to Maliaño, an isolated place some three miles up the harbor, and a Spanish gunboat moored alongside of her.

Repeated Signalling.—Her crew were taken to Alcala de Henares, near Madrid, and interned there—with six important exceptions. The commander, a petty officer, and four skilled mechanics were allowed to remain in Santander, the commander giving his parole. He took a house within a few hundred yards of the submarine and a long way from any other house or building, and lives there with the five members of his crew. The batteries of the submarine are kept fully charged. Since her arrival in Santander signalling seawards has been repeatedly observed, a projector of great power being used; and two illicit wireless transmitters have been detected sending signals in cypher. And only the other day a French ship was sunk a few miles away—I believe within territorial waters—and her crew murdered in the sea after the manner of the company of the Llandovery Castle.

On examination of the submarine it was found that two main bearings, that of the oil motor on the starboard side and that of the electric motor on the port, or *vice versa*, had been burned out, as though the lubrication had been deliberately cut off and the bearings allowed to run hot and seize. The engineer inspector said that he could see no sufficient reason for her coming in. But, being a small boat of an old type, her value as a depot from which to organize tonnage destruction on this coast is considerable; and by her internment the Germans have the advantage of placing a highly experienced officer in Santander to do the work.

Official Attitude.—What any person of common sense will at once ask is, What possible reason can justify the commander's being allowed to remain in the one spot from which he can best organize the destruction of Spanish and Allied shipping? The Spanish Government acted promptly and efficiently in making the escape of the submarine impossible; but in allowing her commander to remain they permit a greater danger to shipping than any

single submarine could be. I have no doubt they did so at the request of the German Embassy; but what pressure have the Allied governments exerted to have him removed? I believe the answer to that question is, None. Report after report has been sent in by the local officials, telegram after telegram has been sent to the "departments concerned"; but the apathy and official stupor in which these departments are sunk have so far been proof against all agitation; these departments remain unconcerned.

The ineptitude and weakness of British policy in Spain are rapidly becoming a scandal, even here; and the time has come when publicity must be given to incidents like this in order that people at home may become aware that the officialdom of the Foreign Office and its branches abroad, the futile exchange of dispatches between "humble, obedient servants" who are far from humble, and obedient only to the paralyzing rules and procedures of their obsolete service, are costing the nation dear in lives and money. I write only of what I see and know, here in Spain; but is it in the least realized how important are our interests here, both now and after the war? This Santander incident is only one of many things which have been and are being bungled or neglected; but the millions of money, to say nothing of the lives, involved in our shipping trade with Santander alone are allowed to remain in jeopardy, while the German Ambassador takes his family for an afternoon excursion to see the submarine and congratulate her commander on the work he is doing for the Fatherland!

Position of Spain.—It is not the Spanish Government which is to blame; it is our own government, or its representatives. In its delicate relations with foreign powers the Spanish Government quite naturally follows the line of least resistance; whoever exerts most pressure on it gets, within reason, what he wants. Hitherto that pressure has all come from the German side. I have reason to believe that some members, at any rate, of the Spanish Government would welcome Allied pressure in certain directions as a support to them in their dealings with the German Embassy, for it is every day becoming more apparent to those Spaniards who think seriously that Spain's chances of realization and development depend on things common to her and the Allies and not on Germany at all. But she gets little help from us, not even the help afforded by a strict regard for our own interests. Spasmodic protests about matters of minor importance do appear to be made, and probably do more harm than good. What is required is a steady and wakeful attention to our interests here, combined with a friendly but firm insistence on our rights and the rights of humanity, and an end to the impunity with which those rights are systematically violated by the German machine.

There are elements in the situation here which it would be mischievous to discuss publicly, but which are present in one's mind as one writes, and add to the gravity with which any well-informed person must contemplate the tale of the ineptitude of British policy in Spain since the beginning of the war. This case of the Santander submarine is only one paragraph in it, but it is perfectly typical. If we do not awake in time we shall not only sacrifice infinitely great interests of our own here, interests which are common to us and Spain, but we may not improbably involve Spain herself in ruinous calamity and disturb the equipose of that group of powers in whose hands the resettlement of half the world will lie. No miracle is required to avoid that catastrophe; only that we should awake and put a little heart and brains into the doing of our work here.—*London Times*, 1/8.

UNITED STATES

ADMIRAL BEATTY PROUD OF AMERICAN COMRADES.—The Lafayette Day National Committee received yesterday from Admiral Sir David Beatty, of the British Grand Fleet, the following delayed cablegram:

"The Grand Fleet desires you to express its pride and satisfaction at being so closely associated with the American fleet, whose officers and

men are bound to us by ties of closest comradeship. They typify the spirit in which the American nation has rallied to the cause of right and justice. Our union is a happy augury for the peace of the world.

(Signed.) "BEATTY."

—*New York Herald*, 10/9.

BUILDING

ITALY BUYS EAGLE BOATS.—Italy has been impressed by the new American type of "Eagle" boats to be used as submarine chasers and the Italian Government has ordered 12 for use in the Adriatic. They will be built by the Ford Co. The *Eagle* boats are 200 feet long, very fast and built of steel with standardized parts.—*Naval Monthly*, September.

"AA-1" LAUNCHED AT FORE RIVER.—A submarine launched for the navy on July 26 at the Fore River Plant of the Bethlehem Shipbuilding Corporation is said to be the largest ever launched in this country. It has been christened the *AA-1*, according to the new system of naming seagoing submersibles. The submarine was christened by Mrs. Alvin H. King, wife of the chief paymaster at the Fore River plant.—*Naval Monthly*, September.

POLICY

NAVAL CONTROL OF ALL ENERGIES AFLOAT.—So long as the Navy Department is not intrusted during the war with the manning and control of the whole government fleet—naval, military and mercantile alike—friction is sure to be created, and the all around efficiency dependent on unified administration cannot be secured. There is no room for rival maritime administrations or for policies where harmonious cooperation will fail and standards of discipline differ. It is a settled rule that everything afloat should in war be controlled by the men best fitted by experience and previous environment for the exigencies and urgencies of hostilities. The existing scheme of assigning troop and war supply and munition vessels to naval officers and crews and all others to a novel and hastily organized division of the Shipping Board is confessedly a makeshift, and, as with all other compromises inspired by expediency, must and does fail to satisfy pressing maritime needs.

The latest example of the difficulties entering into this dual administration is the permission extended the Shipping Board by the Provost Marshal General to continue enlisting men for the merchant marine service, while similar privileges are under draft regulations—formulated for all—denied the army and the navy. The reason advanced for this discrimination is an alleged promise that the Shipping Board would be allowed to enlist three thousand persons coming within the draft age—irrespective of the edict that voluntary enlistments or enrollments must be rigorously stopped. It means also that a small, crude and recently established division is, without proper facilities, encouraged to exercise important duties, while a perfected organization, with years of successful experience, approved methods and ample facilities is calmly brushed aside.

Apart from the futility of this playing with edged tools, the success of the Shipping Board's miniature Admiralty has not so far justified the continuance of an experiment somewhat arrogantly ventured upon. In addition to its drug store recruiting offices this division has six cruising and three stationary vessels, mainly old and ill equipped craft, for the work to be done, and, as their capacity is sufficient for only 4800 men, the rest of the 10,000 said to be gathered must linger on a waiting list. Under naval administration all these recruits could be assembled on board ships and at shore stations where the war discipline so much needed could be inculcated and the only training that counts be consistently carried forward.

This is not to say that the men qualifying for such special merchant ship duty should be compelled to take the entire naval course for accepted points

of efficiency. They should be turned over to skilled merchant marine officers bearing naval commissions and their training completed along the lines demanded. The speedier this unification of effort is recognized the better it will be for all the forces afloat—even though the susceptibilities of a few curious people may be hurt.—*New York Herald*, 9/9.

NAVAL UNIFORM DIFFERENCES ABOLISHED BY OFFICIAL RULE.—Following the example set by the War Department for unifying the military establishment, Secretary Daniels to-day issued a general order wiping out the various differences existing in the uniform used by the regular navy and the naval reservists.

The order says hereafter the uniform of any given rank in the navy shall be identical in every respect throughout except for the various distinguishing corps devices, and that every officer in the navy shall be designated and addressed by the title of his rank.—*New York Herald*, 28/8.

MATÉRIEL

WIZARD EDISON'S NEWEST INVENTION.—*Will Locate U-Boats Five Miles Distant. Delicate Electrical Device On Chasers.—Experiment Held in Bay.*—Few people hereabouts knew that the wizard Edison was here a few weeks ago, to witness the try-out of his latest device, an electric appliance for chasers, to detect the presence of U-boats five miles distant.

Only the operations of the apparatus, thus far kept secret, which Edison has invented for the detection of submarines have become known. The device is electrical in its operations and is fastened to the rapid U-boat chasers. Through its intricate machinery the presence of a submerged U-boat within a radius of five miles of the chaser can be detected. The position of the submerged craft can also be detected with reasonable accuracy. The chaser must come to a full stop before the location of the submarine can be detected. It has not yet been found feasible to attach the apparatus to large ships.

Mr. Edison made his first experiments with the invention in the Chesapeake Bay several weeks ago. Since then there has been a series of other experiments on land to perfect the apparatus.

A Baltimore captain yesterday told of meeting in Philadelphia the captain of an American schooner which recently was torpedoed off the Atlantic Coast. For eight days he was kept a prisoner and was treated with the utmost consideration. One night, the captain said, the submarine passed Atlantic City and Cape May within shelling distance. No shells were, however, fired. The U-boat captain explained that his orders were not to destroy American lives, but to destroy American shipping and English shipping, especially the latter. The periscope of the U-boat was sighted one day by a chaser, which fired several ineffective shots. Seaplanes later appeared over the scene and dropped depth bombs. The U-boat was then four miles away. The captain of the schooner was greatly surprised to see a copy of a New York newspaper only two days old in the cabin of the submarine.—*Evening Capitol*, 5/9.

WINTER CLOTHING.—Attention is being given at the Navy Department to the subject of warm clothing for the crews serving in northern waters in winter. Heretofore, the deck force of destroyers has been furnished, among other things, with fleece-lined coats. Now it is proposed to issue a number of such garments to the battleships for wear by those on lookout duty. The matter of leather clothing for submarine crews also is under consideration.—*Army and Navy Register*, 14/9.

NAVY ORDNANCE'S BIG MINE PRODUCTION.—Mine production by the Ordnance Bureau of the Navy has been so highly developed that there is now a daily production of 1,000 mines, complete in every detail. Ordnance is

keeping so far ahead of mine requirements of American and Allied naval forces in European waters that it is unnecessary to work on mine assembly or loading either Sundays or holidays. This satisfactory condition of mine production is the result of the development and standardization by the Navy Bureau of Ordnance, since the war began, of the new type of American mine. This new mine has all the advantages of the older types and practically none of their disadvantages, this being particularly true in their loading and laying. The new mine apparently is one of the safest in the world to handle, for there has not been an explosion or accident either loading or laying. In the design of the mine special care has been taken to fulfill all requirements of The Hague Convention. Should the mine break adrift from its anchor it is immediately rendered inactive by internal mechanism placed there for that specific purpose, and it floats on the surface where it can easily be destroyed. Should a ship strike a floating American mine the firing mechanism would not function.

To obtain these mines in such enormous quantities, as well as to preserve secrecy regarding their characteristics, a radical departure from usual manufacturing methods was adopted. Naval plants did not possess facilities for manufacturing as many as 1,000 mines per month and such plants were congested with other work. It was impracticable to develop a great plant for the sole purpose of manufacturing mines, since there was not sufficient time for this purpose. The expedient was, therefore, adopted of dividing the mine into many parts and having these manufactured at different commercial plants, all the parts being brought together and assembled, the mine being then loaded at a central mine depot. The work was divided among 140 principal contractors and more than 400 sub-contractors. The unit cost of the new mine is about one-half that of mines before the war, notwithstanding the prevailing high cost of labor and raw materials. This is due to the fact that all the elements of the mine have been standardized in the same way that passenger automobile parts are standardized and that quantity production methods are followed.—*Army and Navy Journal*, 14/9.

PERSONNEL

REAR ADMIRAL WILSON TO BE ADVANCED A GRADE.—*Head of Naval Forces in French Waters Will Command Atlantic Fleet.*—Rear Admiral Henry B. Wilson, who has been in active command of United States naval forces in French waters, is to be promoted to the grade of vice-admiral and placed in command of a division of the Atlantic fleet.

He will relieve Vice-Admiral DeWitt Coffman, who has been assigned to the command of the Fifth Naval District with station at Norfolk, Va.

The new vice-admiral is from Pennsylvania and entered the Naval Academy at the age of sixteen. He has served in all parts of the world and a few years ago was stationed at the Navy Department in charge of the enlisted personnel division.

When promoted from captain to rear admiral about a year ago he was the youngest officer in that grade. He is now but fifty-seven years of age.—*Evening Star*, 2/9.

DRAFTED PERSONNEL OF THE NAVY.—Officers representing the Bureau of Navigation, the Adjutant-General's Office and the Provost Marshal General have had several sessions within the past few days to determine how men of the draft shall be allotted to the Navy. Hitherto all enlistments in the Navy and in the Marine Corps have been voluntary. Without some amplification the effect of the draft act in combination with the order restricting voluntary enlistments would be to prevent any enlistments in the Navy. The Army would take all the men. The physical requirements under Navy Regulations are somewhat more strict than those of the Army, and necessarily so, because Navy enlisted men on shipboard are exposed to certain physical strains which if not up to a high standard of strength

they could not stand and for the further reason that Navy vessels are frequently detached from their bases for long periods of time and therefore replacements of personnel losses cannot be easily effected.

In the Man-Power Act there was a proviso to the effect that all men assigned for draft to either the Navy or the Marine Corps should from the date of their allotment be subject to the laws and regulations of the Navy and the Marine Corps, and this provision gives authority for the arrangement or agreement which, it is generally believed, will become the basis of supplying the Navy and Marine Corps with men. From statements officially made by Rear Admiral Leigh C. Palmer, Chief of the Bureau of Navigation, it is learned that the Navy expects that it will require men at the rate of 15,000 a month, and that the Marine Corps will require 5000 a month for four months following October 31, and thereafter at the rate of 1500 a month. To secure all the men for the Marine Corps and the first 6500 of each month's quota of 15,000 for the Navy a system has been adopted which is the substantial equivalent of voluntary enlistment. Men within the draft ages may on their own application or by selection of recruiting officers be called in the general draft and assigned to the Navy; but they will not be accepted by the Navy until they have passed the physical examination required under the Navy Regulations. The remaining 8500 required monthly by the Navy are to be taken from the run of the draft, but are not to be accepted until they pass the required physical examinations for the Navy. The physical standard agreed upon for these men is not as severe in many respects as under present Navy Regulations. It will be the Army standard, with such modifications as are required to secure men not subject to the particular troubles that would interfere with Navy service. For instance, cases of eczema, which might be passed over in the case of an Army draftee, could not be accepted for the Navy, where exposure to salt water would greatly aggravate the disease. This is a general outline of the agreement which it is believed will be completed for the purpose of equalizing the distribution of men in the respective branches of the Service.

NAVAL STAFF OFFICERS GIVEN ACTUAL RANK.—No order issued by Secretary Daniels for many months has attracted more attention than that made public Tuesday and embodied in General Order No. 418, which reads as follows: "Applicable alike to regulars and reservists, the uniform of any given rank or rating in the Navy shall hereafter be identical in every respect throughout except for the necessary distinguishing corps devices; and every officer in the Navy shall be designated and addressed by the title of his rank without any discrimination whatever." This order is destined to meet with some lively opposition among line officers. Staff officers in the Navy are, under this order, entitled to be addressed by their rank—that is, captain, lieutenant, etc.—instead of "Doctor," "Paymaster," or plain "Mr." This custom has prevailed for years in the United States Army as well as in numerous foreign services, and while it is a radical departure for the United States Navy, it will tend to relieve confusion, especially in the minds of civilians, who ofttimes are at a loss to know how to address a naval staff officer. Since staff officers are required to wear the uniform and insignia of their rank, they see no good reason why they should not be addressed by their rank.—*Army and Navy Register*, 31/8.

LIST OF UNITED STATES NAVAL TRAINING STATIONS AND VARIOUS SCHOOLS FOR NAVY MEN.—Following is a list of United States naval training stations and various special schools where men of the Navy are being trained:

1st Naval District.—Portsmouth, N. H.—Navy Yard Camp.

Boston, Mass.—Bumkin Island Training Camp; Hingham Training Camp; Aviation Ground School; Harvard Naval Unit.

Cambridge, Mass.—Navy Radio School.

Readville, Mass.—Meteorological School.

2d Naval District.—*Newport, R. I.*—Naval Training Station.
New London, Conn.—Submarine Training.
Providence, R. I.—Brown University Naval Unit.
3d Naval District.—New Haven, Conn.—Yale Naval Unit.
New York, N. Y.—Electrical School; Naval Reserve Training Camp; Compass School.
Bensonhurst, Long Island, N. Y.—Diving School.
Bay Shore, Long Island, N. Y.—Aviation Ground School.
Rockaway, Long Island, N. Y.—Aviation Mechanics' School.
Keyport, N. J.—Aviation Mechanics' School.
4th Naval District.—Philadelphia, Pa.—Aviation Mechanics' School.
Cape May, N. J.—Naval Reserve Training Camp.
Princeton, N. J.—Princeton Naval Unit.
5th Naval District.—Norfolk, Va.—Naval Training Station.
Hampton Roads, Va.—Naval Training Station.
United States Naval Academy.—Reserve Officers' School.
6th Naval District.—Charleston, S. C.—Naval Training Camp.
7th Naval District.—Key West, Fla.—Naval Training Camp.
8th Naval District.—New Orleans, La.—Naval Training Camp.
Gulfport, Miss.—Naval Training Camp.
Pensacola, Fla.—Aviation Mechanics' School.
9th, 10th, and 11th Naval Districts.—Great Lakes, Ill.—Naval Training Station.
Chicago, Ill.—Naval Training Station.
Minneapolis, Minn.—Aviation Mechanics' School; University of Minnesota Naval Unit.
Ann Arbor, Mich.—University of Michigan Naval Unit.
12th Naval District.—San Francisco, Cal.—Navy Yard Camp; Naval Training Station.
San Diego, Cal.—Naval Training Camp.
San Pedro, Cal.—Naval Training Camp.
13th Naval District.—Bremerton, Wash.—Navy Yard Camp.
Seattle, Wash.—University of Washington Naval Unit; Naval Training Camp.
Keyport, Wash.—Diving School.—*Official Bulletin*, 21/8.

NAVY NUMBERS 503,792.—The naval personnel now numbers 503,792 officers and men in all branches, Secretary Daniels announced July 23. There are 219,158 in the regular navy, 58,463 in the Marine Corps, 219,566 in the Naval Reserve Force and 6605 in the Coast Guard.—*Naval Monthly*, Sept.

SIX HUNDRED AND FORTY-SIX RESERVE ENSIGNS GIVEN TEMPORARY COMMISSIONS.—Addressing 646 reserve ensigns of the Navy upon the completion of their fifteen weeks special training at the Naval Academy, the Secretary declared that the only way the war will be shortened will be through "victory on the field" for the Allies, or through the acceptance by Germany of "the terms already laid down by President Wilson." The Secretary then declared that at the time of the German drive in March it was "a race between Wilson and Hindenburg." He added, "and that race is now on, and Wilson is winning."—*Evening Capitol*, 18/9.

U. S. MERCHANT MARINE

Ship deliveries for the United States are:

	Tons
June	280,400
July	235,025
August	340,000

COMPULSORY CAMOUFLAGE OF SHIPS.—The government has made the camouflaging of ships a military necessity, and the method in which the

camouflaging is to be done will hereafter be determined by the Navy Department, which will draw out the designs for different types of camouflage painting; and in particular cases, as far as is practicable, will design the camouflage painting for individual ships. The designs will be made at headquarters and will be sent out to the district camoufleurs through the Camouflage Section of the Division of Steel Ship Construction, Emergency Fleet Corporation.—*Scientific American*, 14/9.

TRAWLERS TO REPLACE FISHING CRAFT ON COAST.—Fishing craft destroyed by German submarines off the New England coast will be replaced by the Emergency Fleet Corporation, at the request of the food administration, with deepsea, modern trawlers.

Construction will be begun immediately on the 75 vessels, to be in operation on the Atlantic and Pacific coasts and in the Gulf of Mexico early in 1919. The food administration asked for the boats in order to increase the production of salt-water fish.

Heavy increases in the annual production of haddock, small cod, flat-fish and other salt-water varieties are expected to result from operation of the new trawlers and enable carloads to enter all the interior markets of the country every week in the year, stabilizing prices at low levels.—*Evening Star*, 26/8.

LAUNCH TWO FABRICATED SHIPS.—A program of two ships a week was inaugurated yesterday by the Submarine Boat Corporation when two fabricated steel steamships were launched at Port Newark. Henry R. Carse, president of the corporation, announced that an effort soon would be made to launch three vessels every seven days.

Both cargo carriers displace 5500 tons. The first was the *Ingold*, of which Miss Helen M. Palmer, daughter of George B. Palmer, Newark, representative of the Emergency Fleet Corporation, was the sponsor. The Phoenix Bridge was the second ship launched. She was named by Miss Eleanor Ward Deans, daughter of John Sterling Deans, Vice-President of the Phoenix Bridge Company of Phoenixville, Pa. Counting yesterday's launchings, six steamships have been completed at this yard.—*New York Times*, 1/9.

APPEAL TO SHIPWORKERS.—Three ships a week instead of two will henceforth be turned out at the Port Newark yards, it became known when Director General Charles M. Schwab of the Shipping Board congratulated the men employed at the yard on their increased activity. He spoke to the men after a conference at which were Charles L. Piez, chairman of the fleet corporation, officers of the submarine boat corporation and superintendents and foremen of the yard.

Chairman Piez, who also addressed the workers, said that "between now and the first of next year no matter what sacrifices you may have to make to accomplish it we have got to supply 1,800,000 tons of new ships."—*Evening Star*, 29/8.

SHIP TYPE FOR EACH YARD.—The Emergency Fleet Corporation, through Director General Charles M. Schwab and Vice-President Piez, is working out a new shipbuilding policy whereby each eastern yard will confine itself to construction of one type of vessel. "It ought to increase ship production next year by several hundred thousand tons," said Mr. Schwab. "It will place eastern yards on the same footing as those of the west. It also will help to improve the distribution of steel and increase the production of each yard."

The present contracts will be allowed to run to completion, but every new agreement will be for one design of ship for each specific plant.—*Evening Star*, 6/9.

EXPLAINS WHY PACIFIC COAST SHIPYARDS LEAD.—*More Fully Organized Than New Eastern Plants, Says Fleet Corporation Official.*—The failure of eastern shipyards to equal the record-breaking production of the Pacific coast is due to the fact that new plants in the east are barely through the period of construction and organization and that several of the older yards not devoted exclusively to naval construction are still loaded up with requisitioned tonnage representing many different types of vessels, according to a statement made public to-day by Charles Piez, vice-president of the Emergency Fleet Corporation.

Pointing out that many of the old established yards are working only on naval craft, Mr. Piez emphasizes that eastern plants have shown a gradual improvement and that fabricating yards have moved from ninth to seventh place during the past month, their output having increased fully 60 per cent over that of the month of June.

"There is not a single old yard on the Atlantic coast which is devoted wholly to the construction of a single type of vessel," Mr. Piez said. "Tankers, cargo and passenger vessels are found in one yard, multiplying the problems of management and putting heavy brakes on the output.

"The July standing of the districts on the basis of percentage of assigned task accomplished shows the Great Lakes district leading by 25 per cent, with the California district and the northwest district next in line.

"The New York district, the Baltimore and Philadelphia districts follow with shrinking percentages, while the fabricating yards, New England, the South Atlantic and Gulf yards follow in the order named."

METHODICAL WORK WINNING ON SHIPS.—*Big Task Achieved will be Regarded as One of Most Brilliant of War.*—Less than a year ago there were not 45,000 men employed in American shipyards. To-day there are more than 300,000 skilled mechanics and laborers engaged in building ships, and an additional 250,000 employed in making the engines, boilers, winches and other machinery necessary to equip them.

This tremendous expansion by which the United States hopes to put into service a new merchant marine that will rival the trading fleet of any nation in the world has been accomplished in methodical fashion, without any "fuss and feathers," but achieving a result that industry long will regard as one of the most brilliant victories of the war. It has been brought about by the shipping board through recognition of the principle that untrained men can become skilled workmen only through competent instruction. One of the first tasks of the shipping board, therefore, was the creation of a division of education and training, which has supervised the establishment of training centers and the development of instructors among the foremen and superintendents.

Training of the various kinds of shipbuilders in the yards is accomplished by putting the men to work on production jobs, under the supervision of a yard instructor. This yard instructor has full charge of gangs while they are learning. The efficiency of a green gang under training will average about 80 per cent of finished workmen.

Trained in Teaching Method.—Yard instructors are skilled mechanics trained in the teaching method. This training is given in a training center, where the mechanic is given an idea of instructional management and how to get the instructions across effectively.

The first training center was established at Newport News. To it were sent skilled mechanics, selected from the yards. They were given a six-week course of training, eight hours a day. During the last part of this course they were obliged to spend 40 hours in the actual handling of gangs of green men. Yard instructors are drawn from a variety of trades, such as riveters, ship fitters, ship carpenters, calkers, etc.

Twenty-two plants have sent men for training as yard instructors; 216 of these men have completed their training, while 74 are now in training.

In addition to the training center established in Newport News, there are now several others established at Hog Island, at Chester, Pa.; at the submarine yard at Newark, N. J., and two special centers for the training of electric welders at Schenectady, N. Y., and at New York City.

So far, 13 yards have put in training departments. One yard instructor can train about 150 men each year. The period of training for a green man varies from two to eight weeks. One yard has already trained enough yard instructors in the training centers to turn out weekly 300 skilled mechanics within the yard.

Trade Conversion Course.—In addition to the training of green men, there exists the problem of taking men who are already skilled in allied trades, but have never worked in shipyards, and making them into shipbuilders. This is called a trade conversion course and consists essentially of determining what supplementary work a skilled mechanic from the allied trades must have in order to give him the necessary knowledge to do shipbuilding work. Special instructors are employed in a number of plants to meet this situation.

By training foremen and managers the shipping board has been able to develop in a year the building of wooden ships, which had been a long-lost art, and workmen in many yards have increased in efficiency more than 25 per cent. "Where we have efficient management we have efficient workers," Chairman Hurley declared. "You can't expect to have efficient workmen in an inefficiently managed shipyard, nor can you expect good results. Our shipyard workers generally are as fine a body of men as is engaged in any industry in this country. They are a patriotic, industrious group, and while in many yards they are not as efficient as we would like to have them, they are learning daily and are increasing their output. When the history of our shipbuilding program is written the American workmen, the men who really built the ships, will be the men deserving of any credit that may be due."—*Evening Star*, 20/8.

U. S. BUILDING SHIPS, FIRST TO WIN WAR, THEN FOR FAIR AND SQUARE WORLD TRADE, SAYS HURLEY, ANSWERING FOE PROPAGANDA.—The Shipping Board authorizes the following:

To carry out her great military program America is building a large fleet of transports and food ships. After the war this merchant marine will be used in America's enormous ocean-carrying trade.

It is to be expected that enemy propagandists should endeavor to use this American merchant fleet as a basis for arousing distrust between the allies.

Guarantees of Fair Dealing.—Guarantees of fair dealing in this matter are found in America's unselfish policy in fighting for democracy, in President Wilson's devotion to the cause of humanity, and also in America's past record.

President Wilson has demonstrated to the world that the people of the United States are not fighting for the permanency of their own liberty alone but for the liberty of civilization everywhere.

It is unthinkable that a nation fighting shoulder to shoulder with other great democracies should, after the war, turn its resources against them for trade conquests of the very kind which were largely instrumental in bringing on the war. If our ships do not bring prosperity to our neighbors as well as to ourselves, our own pride in the achievement will be diminished. Our ships will be operated after the war upon principles which recognize human and national rights and equities. This is a part of the consistent policy of President Wilson. It is made plain in his public statements. It is also plain in the history of the United States, which is free from selfish aggression in either territory or trade.

First of All Win the War.—In building her merchant fleet America plans first of all to win the war, and after that to overcome her own neglect in providing ocean transportation for her own trade. To this end the people of the United States are preparing to develop transportation on their own

trade routes, without disturbing the trade or rights of other nations. And they, furthermore, hope that the American merchant marine will play a large part in bringing the neighboring democracies of the American hemisphere closer together.

Enemy Motives Apparent.—Suggestions of selfish motives will, of course, be circulated in connection with the fleet we are building. Every nation lined up against autocracy can be depended upon to detect the source of such suggestions, and discount them, and maintain the solid line for democracy and humanity till the end.

EDWARD N. HURLEY, *Chairman*,
United States Shipping Board.
—*Official Bulletin*, 23/8.

MARINE ENGINEERS WANTED FOR U. S. MERCHANT FLEET.—The Shipping Board issues the following:

Marine engineers holding land jobs are on a special list kept by the Shipping Board, which may soon call on all such mariners to say farewell to terra firma and lend a hand in manning the new ships of the merchant marine. The list was prepared by agents of the sea-service bureau of the Shipping Board's recruiting service, who are now holding a convention at Boston.

The convention notified Chairman Edward N. Hurley, of the Shipping Board, that there is a shortage of chief and first assistant marine engineers, recommended that men holding licenses for lower grades be urged to try for higher licenses, and suggested that engineers now ashore be drawn upon to fill berths now vacant on ships at Atlantic and Pacific ports. Chairman Hurley, of the Shipping Board, authorized the sea-service bureau to take any measures necessary to secure the engineers needed, in addition to the 500 a month now being specially trained at Shipping Board schools.—*Official Bulletin*, 22/8.

MERCHANT MARINE WANTS 4000 VOLUNTEERS IN MONTH OF SEPTEMBER.—Four thousand volunteers will be accepted in September by the United States Shipping Board for the merchant marine training ships, it was announced to-day by the board, 2000 for training as firemen, 850 as sailors, and 1150 as stewards, cooks, or messmen.

These will be taken into the training service, as follows: At the Atlantic training base at Boston, 3000; at San Francisco, 500; and at Seattle, 500. The merchant marine is the only seagoing service now accepting volunteers. They may enroll at 6000 special recruiting stations of the Shipping Board, at drug stores in 48 states. Eighteen is the minimum age limit.—*Official Bulletin*, 4/9.

MANNING U. S. MERCHANT FLEET.—With the success of its huge shipbuilding program assured, the United States Shipping Board will now concentrate its power on the manning of the merchant marine with all-American crews. Chairman Edward N. Hurley states: "The Shipping Board's efficiency methods in putting the American shipyards on the map will be paralleled by Mr. Hurley in creating an adequate personnel for the merchant ships built and controlled by the Shipping Board. Not only the war needs of the merchant marine will be considered in the launching of an extensive educational campaign, but a broad foundation will be laid by organization for maintaining a 100 per cent American personnel in the great peace fleet with which the United States will take a commanding place in world trade after the war. The Shipping Board's manning program is based on the present and potential needs of the merchant service in coastwise and overseas traffic, for both existing and for new tonage. Since the war began the new tonnage has been divided between the Shipping Board and the navy, virtually on a 50-50 basis, the ships assigned to the navy being used in its overseas transport service.

Division of Tonnage.—"This division of tonnage is based on an agreement between the Shipping Board and the Navy Department dating from last year, which has not been changed. The ships used by the navy for transporting troops and animals as well as cargoes of war materials through the war zone are manned by naval crews. Ships making commercial voyages through the war zone and to all other parts of the world are manned by civilian crews. The Shipping Board recently gave the Navy Department an estimate of the number of men the navy will probably need for the merchant ships turned over to it by the Shipping Board. It is now meeting its own needs for the country's commercial vessels by recruiting and training men for service in the civilian crews of the merchant marine.

Training System for Crews.—"The Shipping Board since the war began has been building up a training system for merchant officers and crews that will now be used to its fullest capacity for producing the men needed in the merchant marine. This system, under the direction of the Board's recruiting service, now has 10 training ships and receiving ships actually in commission, and three others authorized, two of the latter for the Gulf and the Great Lakes, respectively. The Board's Atlantic training squadron, based at Boston, has three cruising training ships which make regular visits to Philadelphia, New York, Norfolk, and other ports. A receiving ship is maintained at New York and another at Norfolk. In a Pacific squadron are four training vessels, two based at San Francisco and two at Seattle. The Gulf training ship will be based at New Orleans and the Great Lakes ship at Cleveland.

Three Thousand Men Monthly.—"The output of these training vessels will be 3000 men a month. Young Americans from all sections of the country are wanted for this service. The Board maintains more than 6000 neighborhood recruiting stations at drug stores, where they may enroll. Their transportation will be paid to the nearest training station, and they will receive an intensive course in sea training that will fit them in the shortest possible time for service in the merchant fleets of their country. In the next 12 months approximately 36,000 will be accepted for training. Several thousand have already been trained."

Study of man power for the merchant marine from every angle presented by war conditions and the future trade requirements of the country is the duty of a special committee of the United States Shipping Board, the appointment of which has been announced. The committee is composed of George Nichols, of Boston and New York, cotton manufacturer and business organization expert; A. S. Hebble, of New York, connected with the Southern Pacific Shipping Service, and Dr. E. M. Hopkins, president of Dartmouth College, a recognized authority on labor problems, at present connected with the War Department. William C. Ewing, of Boston, formerly connected with the Boston Chamber of Commerce, is secretary. James Thompson, of New Bedford, Mass., will assist the committee which has opened headquarters at 45 Broadway, New York, room 705.

Chairman Hurley has ordered that the committee make a searching study of all conditions in the merchant marine affecting the standing of American merchant officers and crews as a body, and to report on ways and means of putting American merchants' crews on the highest level of character, discipline, and efficiency.—*Shipping*, 17/8.

SHIPS TAKEN OVER AS GERMAN OWNED.—On the ground of German ownership, the American Transatlanic Company, which, until its ships were commandeered by the United States Shipping Board in October, 1917, operated in ocean trade a fleet of eleven steamships flying the Stars and Stripes, has been taken over by A. Mitchell Palmer, alien property custodian.

Richard G. Wagner, formerly of Milwaukee, an American-born citizen, head of the concern for three years, deceived the American Government "with truly Prussian arrogance," as well as British and French prize courts as to the real ownership of the property, according to Francis P. Garvan,

investigator for the custodian, who has made public a summary of Wagner's activities. The ships were, in fact, bought with German gold and the company was organized eight months after the outbreak of hostilities with funds which Count von Bernstorff, the German ambassador, caused to be transmitted here for Wagner's benefit.

Wagner under the examination of Mr. Garvan protested the ships were American owned until the last, but finally confessed before the weight of evidence that the backing of this venture to keep German commerce on the high seas came from German shipping interests.

An effort on the part of Wagner to have his ships given a clean bill of health even after the United States declared war was cited. Mr. Garvan quoted a resolution which he said Wagner induced Representative Cary of Wisconsin to introduce in Congress in May, 1917, setting forth the American ownership of the American Transatlantic Company and calling upon the Secretary of State to report what steps had been taken to protect its ships from the aggression and interference of any foreign government, either at sea or at any foreign port, while engaged in legitimate trade."

Of the eleven ships purchased by the company one was sunk, three were seized by the British and one by the French, and six were requisitioned by the United States Shipping Board. These six requisitioned vessels were: The *Manitowac*, of 4471 gross tons; *Maumee*, 2509 tons; *Winnebago*, 4362 gross tons; *Au Sable*, 3154 gross tons; *Allaguash*, 3826 gross tons, and *Muskegon*, 3324 gross tons.

To separate the ownership of the vessels remaining from the four seized, Wagner organized in 1917 a new company, known as the Foreign Transport and Mercantile Corporation, with a capital of $2,500,000, and this concern also has been taken over by Mr. Palmer.

Wagner had refused, according to Mr. Garvan, an offer of $7,500,000 for his fleet from the Hudson Bay Company and another of $9,300,000 from French interests, the latter offer representing a profit of nearly $7,000,000. It is understood that the shipping board has withheld payment of $700,000 to Wagner for the rental of the ships requisitioned.—*Evening Star*, 5/9.

DRY DOCK FOR NEWARK.—Work will soon be started on what is to be one of the largest dry dock plants in the United States, located on Newark Bay. It is reported that contracts have been let to Holbrook, Cabot & Rollins, of New York, for the entire work, which will involve an outlay of between six and eight million dollars. These docks will be part of the plant of the Federal Shipbuilding Company, on the Hackensack River. The company recently obtained 114 acres of land adjoining their property in Kearney. At the present time the Federal Shipbuilding plant consists of twelve ways, on which they are constructing a fleet of thirty 9600 ton freight-carrying vessels for the Emergency Fleet Corporation.—*Shipping*, 7/9.

CONCRETE SHIPS.—Enlargement of the concrete ship construction program can be made only at the expense of the output of steel and wooden ships, Charles Piez, vice-president of the Emergency Fleet Corporation, said last week and in replying to those who have criticized the corporation for not building more concrete ships. Forty per cent of the work of building a ship, Mr. Plez said, is represented in the making of machinery and other equipment which can be done only by highly skilled artisans of whom there is a shortage. Hull construction, he said, was proceeding more rapidly than the production of motive power, and the building of additional hulls. "Our output of ships is limited by the number of vessels we can equip rather than the number of hulls we can launch," said Mr. Piez. "As a carrier the steel ship is admittedly from 15 to 20 per cent more efficient than a wooden or concrete ship of similar tonnage. The Emergency Fleet Corporation has, therefore, been wise in concentrating its efforts on the construction of steel tonnage and treating the wood and concrete ships as purely emergency agencies.—*Shipping*, 17/8.

UNITED STATES ARMY

THE SHARE OF THE BRITISH NAVY.—Considerable satisfaction is expressed in England with the tribute that Mr. Franklin Roosevelt has paid to the British Navy. His statement is considered timely also because of the tendency of some minds to underrate Britain's war-effort on land as well as at sea. The editor of the London *Truth* remarks:

"Mr. Franklin Roosevelt, the Assistant-Secretary of the United States Navy, has rendered us a service for which we have every reason to be grateful. He has told the world that 60 per cent of the American troops now in Europe have been brought over in British ships, escorted by British men-o'-war. The facts were, of course, known to many—even to many journalists; but when Mr. Baker, the United States Secretary for War, made his momentous statement regarding the crossing of the first million, he put the credit for the safety of their transport upon 'the superbly efficient protection which the Navy'—*i. e.*, the American Navy—had afforded. After that one couldn't very well start an argument as to what proportion of the credit was due to the United States and how much to others. I ventured on July 10 to hint that others were, at any rate, entitled to some of it, and I am very glad that Mr. Roosevelt has now given us the facts. It is just as well that some one occasionally stumps the Germans in their efforts to prove that Great Britain is a mere passenger in the Allies' war-galley."—*Literary Digest*, 14/9.

HANDLING WOUNDED ON TRANSPORTS.—When the navy took over the handling of the army troop transports, it at the same time assumed the work of caring for army sick and wounded being brought back from France. Inasmuch as the navy has nothing to do with the transportation of these invalids to the port of foreign embarkation, it receives them as they are sent, and at once attempts to make them as comfortable as possible on board the returning transports.

At the end of every voyage the invalids are interrogated by inspectors concerning their treatment on the transport, and every suggestion that will make conditions better for these men receives careful consideration. However, the conditions of cleanliness, good nursing and rest on the transports compare so favorably with those on the railroad trains that take them to the ports of embarkation, that nothing but satisfaction is heard from the men.

The good work on board the transports is the result of the provision by the naval medical corps of the best facilities that could be placed on the transports for the caring of sick and wounded. The surgeon general of the navy foresaw the indispensability of having everything in readiness for the time when the number of wounded to be returned would be great and the navy has been ready with every surgical and medical need for their treatment and care.

At times it was thought that the navy was carrying a larger number of physicians and surgeons in its medical corps than was necessary, but they were under training, so that, when they are needed, they not only are available, but trained in the duties they are called upon to perform.

This transportation of the sick and wounded of the army was taken over by the navy after we entered the war. Returning transports, rather than special hospital ships, are used in the service, because, owing to past performances, it was believed that the Germans would be no less apt to attempt to sink hospital ships than transports. Besides, it saves the drain on the available ship tonnage that would occur in the setting aside of vessels for special service as hospital ships.—*Washington Post*, 8/9.

STOPPING OUR PRODUCTION OF BRISTOL FIGHTERS.—Early last year it was decided when a demand for two-seater fighters was great, to put into production at the Curtiss plant an adaptation of the Bristol fighter, an English battleplane, fitted to a 12-cylinder Liberty motor. Recent flying tests have

demonstrated that this machine is over-powered and not of military value, lacking maneuverability and not having sufficient speed for war purposes. Inasmuch as the DeHaviland 4 is in production and meets the requirements, and can be produced as fast as engines can be supplied, so that there will be no decrease in the number of planes going overseas, the Bureau of Aircraft Production is compelled to take the position that the country will best be served by discontinuing Bristol planes. Every effort is being made to put into production at the Curtiss plant the S. E. 5 and the Caproni. Both planes are well known and are not experimental in any way. The Bureau of Aircraft Production hopes to be able, in the near future, to re-employ the people who will of necessity have to be laid off under this order.—*Scientific American*, 24/8.

AMERICAN HOSPITAL BARGES WILL SAVE MANY OF WOUNDED.—The chief surgeon of the American expeditionary forces has just completed arrangements for a hospital barge system to transport American wounded with the least possible movement, according to the *Stars and Stripes*, the official newspaper of the American Army in France. Barges 120 feet long, with a draft of one foot, will be used, and they will be moored to landing places as near as possible to the front. France's extensive canal system will greatly facilitate the work.

Such barges already are being used for this purpose, but a new feature will be introduced in barges fitted with operating rooms. The substitution of water transport for railway travel is expected to save many lives. It is estimated that eighty per cent of all wounded are able to return to the front within forty days, ninety per cent who reach field ambulances recover, ninety-five per cent recover who reach casualty clearing stations and ninety-eight per cent recover who reach base hospitals.—*New York Herald*, 8/9.

MISCELLANEOUS

THE "ST. PAUL," LONG SUNK AT PIER, NOW ON AN EVEN KEEL.—The wrecking crews that have been working on the American line steamship *St. Paul* since April 25, on which date the big vessel turned over on her side in the slip between piers 60 and 61, Hudson River, succeeded in getting the steamship on an even keel yesterday and at once began the work of pumping her out.

Late yesterday afternoon 10 feet of the big steamship was above the surface of the river and those in charge of the salvage work declared their belief that the famous old American line vessel would be afloat some time to-day.

The *St. Paul* had left the dry dock where she had been overhauled preparatory to going into the service of the navy and was being warped into her berth, when she turned over and sank side down. Two men lost their lives in the accident. They were laborers who had gone below for their effects at the first sign that the vessel was listing.

It was said at the time of the accident that workmen in the dry docks had left the *St. Paul* sea cocks open by mistake and that a sudden inflow of water had caused the vessel, which was without ballast, to turn over and sink. As she toppled over her masts snapped off when they came in contact with the pier shed. Since then all of the *St. Paul's* deck structure has been cut away.

In preparing to right the vessel steel brackets were rivetted to her side so that cables could be attached to their ends. The final attempt to turn the ship right side up was made with 20 steam winches hauling on the cables attached to the brackets. The cables moved with almost imperceptible motion, but gradually brought the steamship to an even keel.

It is estimated that at least three months will be required to repair the *St. Paul*, for her immersion for so long a time has played havoc with her exterior as well as her interior. While her plates are not injured, she will have to be cleaned and repainted and all of her interior refitted before she can be used as a transport.—*New York Herald*, 12/9.

SHIP WITHOUT IRON.—The white yacht, *Carnegie*, now in its Washington moorings, is a unique ship, returned from a unique voyage. The yacht was built and equipped by the Carnegie Institution, for the purpose of making a magnetic survey of the globe. It is built entirely without iron. This metal anywhere about would deflect the compass needle and impair the accuracy of the delicate observations in which the expedition was engaged. Consequently, copper and brass and aluminum were used in place of iron, even for the nails and rivets.

It is of vast importance to the navigator to know the exact declination of the compass—that is, its divergence from the true north wherever he may be upon the seas. The effect of this divergence upon the superstitious fears of the companions of Columbus is a story learned by every child who studies American history. Before the voyage of the *Carnegie*, many stretches of the ocean remained uncharted magnetically and even the observations available were far from reliable.

The voyage of the *Carnegie* has lasted nine years, and covered a quarter of a million miles. It has charted all the seven seas, looping and relooping them. It has traversed the Pacific twice from north to south, and twice from east to west. It has sailed the entire Atlantic and rounded the Horn three times. It has visited South Georgia, Easter Island, Samoa and Bering Sea. It circled the Antarctic continent in a single season. And it has had enough adventures to supply a whole library of romance.

The work is not completed, for the magnetic pole has an inconvenient habit of shifting. It will require many more voyages to determine the annual rate of variation. When this shall have been done the compass will become an entirely dependable guide for the seaman.—*Baltimore Sun*, 7/9.

NAVY IS MOVING TO ITS NEW QUARTERS.—Transfer of the Navy Department from the State, War and Navy Building, at Pennsylvania Avenue and 17th Street, to quarters in the new buildings in Potomac Park, between 18th and 20th streets and B Street and the river, began late yesterday afternoon. Not all divisions of the Navy Department will be in their new quarters, it is expected, before late October or early November.

The bureau of operations began to move at 3 o'clock yesterday. At noon to-day the divisions of aviation, of operations and the compensation board were well settled in new offices.

The bureau of steam engineering will be the next division to be moved. It is expected to effect the transfer of this bureau before the end of the present week.

During the week beginning August 26 the bureaus of construction, repairs, supplies and accounts will be moved. Other bureaus, divisions and offices will be transferred as rapidly as possible during the following two months.

The ordnance bureau, now occupying quarters in the Interior Department, will be among the last divisions to be moved.

The space vacated by the Navy Department in the State, War and Navy Building will be used to house the overflow of the State and War Departments. The Secretary and Assistant Secretary of the Navy and the chief of operations will retain their old offices in the present building, as will also the Navy Department Library.

The new Navy Department buildings were built with great rapidity according to prominent architects. It is regarded as a wonderful piece of work considering the short space of time in which the buildings were finished.

Although the buildings were started just four months ago, nevertheless two wings are already occupied. In less than six months from the beginning of work all the buildings are expected to be finished and occupied.—*Evening Star*, 19/8.

QUICK ACTION BY GUNNER SAVES SUBMARINE'S CREW.—Secretary Daniels has commended Frank R. Wills, chief gunner's mate, United States Navy, for presence of mind and resourcefulness which prevented possible loss of life on a United States submarine on July 8, 1918.

A torpedo became wedged in the bow torpedo tube, and workmen opened the tube door, with the result that the water pressure washed the torpedo back into the torpedo room, which immediately filled with water. This endangered the lives of the men in the submarine. The workmen did not know what to do to avoid disaster, but Wills saw the danger and closed the tube door. The reports state that Wills's quick thought and prompt action saved the lives of the men and prevented damage to the craft.

Wills enlisted at Honolulu, Hawaii, April 6, 1915, giving as his next of kin, sister, Mary C. Smith, Minot, N. Dak.—*Official Bulletin*, 22/8.

ORDNANCE AND GUNNERY

GUN EROSION.—Professor H. M. Howe draws attention to the fact that many points connected with the erosion of guns were rendered intelligible by a consideration of the iron-carbon diaphragm. It has long been known that the interior surfaces of a gun became hardened on firing, the effect being perceptible even after as few as five shots. Professor Howe believes that this hardened layer is not due to carbonization of the metal, but is merely a result of heat treatment. The liner of a 14-inch gun has been worn out by 170 shots, and therefore, the total effective working life of this gun was only about 3.4 seconds.—*Scientific American*, 14/9.

SOURCES OF TOLUOL.—Where are we to get the toluol needed for explosives? In replying to this query, Professor S. W. Parr, in a recent address, points to the great increase in the number of by-product coke ovens in this country. However, if 20,000,000 tons of coke are made in these ovens during the present year, we shall get from this source only 10,000,000 gallons of toluol, which is about one-fourth as much as the government will need for munitions. Another promising measure recently inaugurated is the stripping of city gas of this material, which can be spared without any serious detriment to the gas and amounts to about .04 gallon for each 1000 feet of gas. It is estimated that 10 of the largest city gas plants of the country will yield about 10,000,000 gallons of toluol. This progress is making toward a solution of this serious question.—*Scientific American*, 2/8.

NEW GUN PLANTS FOR THE ARMY.—Fifteen of the sixteen government gun plants for forging and machining cannon have been completed and the sixteenth is about 95 per cent complete. This represents an expenditure by the government of $35,000,000. All of these plants are building cannon or cannon forgings for mobile artillery ranging from the 1½-inch anti-tank gun to rifles of 10 inches bore. In addition to these plans, the United States Steel Corporation has under way a $30,000,000 plant for the manufacture of siege guns.—*Scientific American*, 14/9.

MOVING TARGETS AND TORPEDO ATTACK, NO. I.—It is generally known that it is more difficult to hit a target that is moving than a similar sized target that is stationary, and that the difficulty of hitting a moving target increases with its speed. In illustration of the influence of speed, we may quote the following remark of the United States Naval Consulting Board: "The percentage of vessels having speeds of 15 knots or more which have suffered from submarine attack is very small, while the losses of slow vessels, whose speed is less than that of a submerged submarine [say 10 knots] is practically 100 per cent of those attacked."

While this influence of speed in a target is clearly recognized, it remains a fact that an exact explanation as to why a moving target is more difficult

to hit than one that is stationary or moving less rapidly is not readily to be found. The simplest case of a moving target is a ship attacked by torpedo from a submarine. Yet even here an easily understood discussion of the problem seems to be wanting.

The problem is a kinematical rather than a kinetic one, that is to say, it involves the discussion only of certain times, lengths and speeds, and not masses and forces. At first sight, therefore, it appears that it should yield fairly readily to ordinary mathematical treatment. But when we attempt so to investigate it, even in the relatively simple case of a torpedo discharged against a moving ship, we soon become entangled in a mass of very cumbersome and complex expressions, from the study of which it is next to impossible to arrive at a general view of the influence of the various factors involved. On the other hand, it has been found that a very clear conception of the whole problem can be obtained by studying it graphically. Although we have failed to find the problem thus treated in any literature to which we have access, we refrain from suggesting that the facts established by the treatment are not already well known in the proper quarters. Our object is merely to discuss the problem in a manner that will appeal to and interest the general reader.

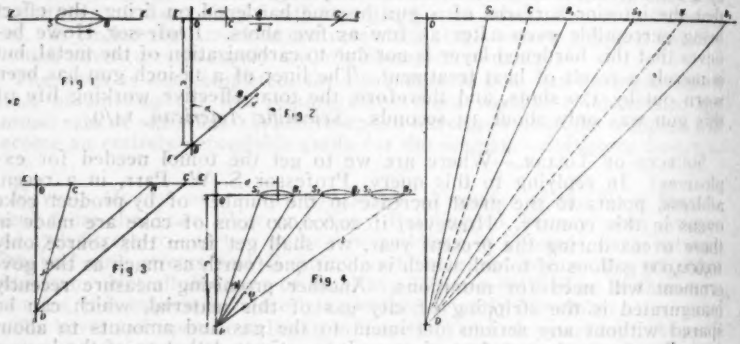


FIG. 5

Operation of Torpedoes.—The average depth at which a torpedo is set to travel is from 12 feet to 15 feet. The fact that a torpedo travels at a constant depth beneath the surface, acquiring such depth very soon after leaving the torpedo-tube and independently of the degree of submergence of the tube, materially simplifies the conditions to be attended to in order to secure a hit. In general, a target of length l at a range r subtends at the point of discharge of the projectile an angle θ given by $\tan \theta/2 = l/2d$. To obtain a hit, the course of the projectile must be trained in the horizontal plane within the limits of this angle. If the height of the target be h the angle subtended by it in the vertical plane is ϕ given by $\tan \phi/2 = h/2d$. The course of the projectile must, therefore, be trained in the vertical plane within the limits of this angle. We are here assuming that the trajectory of the projectile is a straight line coincident with the prolongation of the center line of the barrel from which it is fired. In actual fact, of course, it is not, for a projectile drifts to the right or left of this imaginary trajectory under the influence of the rifling of the barrel, and in the vertical plane describes a more or less parabolic path. Even so, it remains true that the solid angle subtended by the target within the limits of which the center line of the barrel must be trained is inversely proportional to the square of the range. In the case of a torpedo, the action of the hydrostatic valve makes it unnecessary—within limits—to pay attention to the vertical valve, subtended by the target. Given a correct setting of the

hydrostatic valve, the depth of the target—the draught of the ship—can be eliminated from our considerations. In torpedo practice, therefore, the apparent size of the target is inversely proportional, not to the square, but only to the first power of the range.

The speeds of torpedoes extend from 25 to 45 miles per hour—2200 feet to 3960 feet per miunte. They are propelled by a store of compressed air. As the journey proceeds this stock of energy diminishes, but up to a certain range the speed remains more or less constant, by virtue of the action of a constant pressure valve, through which the air passes between the reservoir and the propelling engines. After a travel of several thousand yards, however, the speed begins to fall off, and in the end, if no hit is obtained, becomes, of course, zero.

General Statement of Problem.—The problem for discussion may be stated in the following general terms: Let $S\,B$—Fig. 1—be a target moving along the course $E\,E$, and let D be a point from which a projectile is discharged at the target. It is required to discover the conditions that must be fulfilled in order to obtain a hit on the target, and how these conditions are affected by the variations in the magnitudes of the variable factors involved. Our discussion of this general problem will, incidentally, reveal why it is more difficult to hit a moving target than one that is stationary. It can, no doubt, be stated at once that the reason is simple and obvious; a stationary target permits the taking of a direct sight on it, whereas with a moving target the course of the projectile cannot be set by a direct sight, and has to be calculated or estimated. This is perfectly true, but that it can only be a partial explanation of the subject is obvious from the fact that it does nothing toward explaining why it is more difficult to hit a target moving quickly than one moving slowly, for in both cases direct sighting is out of the question. It may here be stated that we will endeavor to follow out all features of the problem to their logical conclusion, in order that the reader may be fully equipped to tackle, if he feels so disposed, a certain practical aspect of it to which we will later on direct attention.

The Target as a Point.—The first step in our treatment of the problem is illustrated in Fig. 2. In this let A be a point moving with speed s along the straight course $E\,E$, and let B be another point moving with speed v along the straight course $F\,F$. At zero time let the point A be at C and the point B at D. It is required to find at what angle α the course $F\,F$ must be set, relatively to the normal line $D\,O$, in order that the points A and B may reach simultaneously the point of intersection G of the two courses $E\,E$ and $F\,F$. It should perhaps be remarked that for the particular case of the distance d being zero the problem can be solved—and carried on from a point target to an extended target—by ordinary mathematics in a comparatively simple manner, although some of the expressions arrived at are cumbersome. But for the general case covering positive and negative values of d such mathematical treatment, if not impracticable, will fail to lead the general reader to a clear conception of the problem in all its bearings.

Graphical Solution for a Point Target.—A simple graphical solution of the problem, applicable to all values of d—positive, zero, or negative—is represented in Fig. 3. The construction is as follows: Join the zero points $C\,D$. Lay off any convenient distance $C\,H$ along $E\,E$ in the direction in which the point A is moving. Let this distance be x, and let the ratio of speed v to the speed s be k. Then with center H and radius $k\,x$ cut the line $C\,D$ at J. Draw $D\,G$ parallel with $J\,H$. From similar triangles, $D\,G : C\,G = J\,H : C\,H = k\,x : x = k = v : s$. *Hence* $D\,G/C\,G = v/s$, *or* $D\,G/v = C\,G/s$. Therefore the time taken for the point A to travel with speed s from C to G is equal to the time taken for the point B to travel with speed v from D to G. The two points thus reach the point G simultaneously, and the angle $O\,D\,G$ is the required training angle α for the course $F\,F$ of the point B.

Graphical Solution for an Extended Target.—In Fig. 4 the treatment is shown applied to the case of an extended target $S\,B$. In this case d is

taken as the distance from the point O to the mid-point of the length of the target in its zero position $S_1 B_1$. The construction involved is simply a double application of the above graphical treatment. It is applied first to the point S_1 to get the point S_2, and then to the point B_1 to get the point B_2. If the projectile is a torpedo and the target a ship—as we will now onwards assume them to be—it is clear that the torpedo, if discharged along the course $D S_2$, will just hit the stern of the ship, and if discharged along $D B_2$ will just hit its bow. If the torpedo course it set somewhere within these two limits the target will be struck somewhere along its hull between the bow and the stern. If the torpedo course is set outside the limits of the angle $S_2 D B_2$ the torpedo will miss the ship, crossing its course at some point ahead or astern of it.

Fig. 4 is purely diagrammatic. In Fig. 5 we reproduce on a small scale the solution of the problem for the following data: Length of ship, 400 feet; speed of ship, 1000 feet per minute—say 25 knots, normal range, r, 1500 feet; distance, d, + 500 feet. It is found by measurement that the virtual length $S_2 B_2$ of the target is in this case 540 feet, or 1.35 times the actual length of the ship. The length of the target has thus, as it were, been drawn out by 140 feet, or at the *average* rate of 4.2 inches per foot of actual length. If we apply the graphical construction to the mid-point C of the ship's length we get the point K. On measurement it is found that K is not the mid-point of $S_2 B_2$. Instead, $S_2 K$ measures 260 feet, and $K B_2$ 280 feet. Thus the sternward half of the ship has been drawn out by 60 feet and the forward half by 80 feet. The rate of stretch is therefore not uniform along the length of the hull. The first foot, measuring from the stern forward, stretches but little, while the last stretches considerably. As this peculiarity leads us away from our general problem we will not discuss it further here. For the present it need only be remarked that it is presumably of some importance in view of the fact that certain points in the length of the ship's hull are more vital than others.

The fact that the movement of the ship has, in this specific case at least increased the length of the target is paradoxical, for it seems to suggest that it should be easier to hit a moving target than a stationary one; whereas we know that the very reverse is the case. The truth of the matter, of course, is that it is not the length of the target that concerns us but the angle that that length subtends at the point of discharge of the projectile. In the case illustrated in Fig. 5 the angle $S_2 D B_2$ measures 11.75 degrees, as compared with 13.75 degrees for the angle $S_1 D B_1$. Had the ship been stationary at $S_1 B_1$ it would have subtended this latter angle at the point D. The fact that it is moving results in a reduction of the angle subtended, and therefore requires the course of the torpedo to be set with greater accuracy—that is to say, within narrower limits—than in the case of the target stationary. The explanation of this reduction of the subtended angle is simple: what is gained by the virtual increase in the length of the target is more than lost by the movement of the target over towards the right.

Characteristic Results.—In Fig. 6 the construction is set out for the same data as used in Fig. 5, but for seven different values of the distance d, namely, — 2000, — 1500, — 1000, — 500, 0, + 500 and + 1000 feet. Certain readings taken from the diagram are entered on the table given with it, and in Figs. 7 and 8 these readings are shown plotted. Thus Fig. 7 shows the value of the angle $S_1 D B_1$ (or ϕ) in Fig. 4, the value of the angle $S_2 D B_2$ (or θ), and the value of the ratio θ/ϕ. Fig. 8 shows the value of the virtual length $S_2 B_2$ (or l_v) of the target. Both diagrams are plotted on a basis representing the values of the variable distance d.

Several facts are at once apparent. As regards the value of the angle ϕ; this, of course, as is to be expected, gives a sinusoidal curve, rising to a maximum at $d = 0$ and symmetrical about the vertical axis through this maximum. The maximum value of ϕ, namely, 15.25 degrees, is, of course, that angle which would be subtended by the target if it were stationary at the point O and the torpedo discharging vessel were at D, that is to say,

in the most favorable situation for obtaining a hit. This maximum or most favorable angle for the stationary target will be referred to as the angle F.

As regards the value of the angle θ, Fig. 7 shows that this angle also gives a sinusoidal curve as d changes from a high negative value through zero to a high positive value, and that the curve is apparently symmetrical about the vertical axis through the maximum value. Two striking points are, in addition, observable from the curve. First, the maximum value of the angle θ is greater than the maximum value of the angle ϕ; that is to say, is greater than the angle F_s. Secondly, the angle θ attains this maximum value when the distance d is still negative, and not, as in the case of the angle ϕ, when this distance is zero. Reading from the curve given in Fig. 7 we find that the maximum value of the angle θ is as nearly as possible equal to 15.9 degrees, and occurs when the distance d has some value round about — 300 feet. Here then is a curious point. The best instant at which to discharge a projectile at a moving target is when the target is still some distance off being directly opposite the point of discharge of the projectile. Again, if the projectile is discharged at this instant, the angle between the limits of which its course must be set to secure a hit is actually greater than the corresponding angle F_s for the target stationary and the point of discharge of the projectile in the most favorable position. The fact that the target is moving and not stationary, actually increases the chances of its

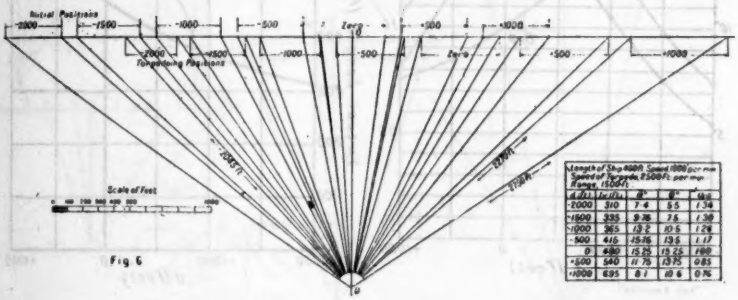


Fig 6

being hit so far as the magnitude of the angle it subtends is concerned. In practice, of course, another factor enters into the calculation of the target's chances of being hit, namely, the accuracy with which the instant at which to discharge the projectile can be determined. If the target is stationary this factor, all-important for the moving target, disappears.

The curves for θ and ϕ intersect at $d =$ zero. What this means is illustrated in Fig. 9. If the discharge of the torpedo is delayed until the midpoint of the target coincides with the point O, then the angle θ subtended by the target, when it is in the torpedoing position $S_2 B_2$, is exactly equal to the angle ϕ which it subtends when the torpedo is discharged. The analysis of the problem when d is zero can, as stated above, readily be effected by ordinary mathematics, and it can be proved that this equality between θ and ϕ when d is zero is quite generally true and is not an incidental result of the particular values of l, s, v and r adopted in connection with Fig. 6. Whatever may be the length and speed of the target, the speed of the torpedo and the normal range r, the angle θ will always be equal to the angle ϕ for d, zero. The fact is that the virtual length $S_2 B_2$ of the target is, for this particular condition, just sufficiently greater than the actual length $S_1 B_1$, or l, of the ship to compensate for the displacement of the target to the right.

As regards the ratio, θ/ϕ; Fig. 7 shows that while the relationship between θ and ϕ follows a smooth curve, the law connecting them is not simple.

As regards the virtual length, l_v; Fig. 8 shows that as d increases from -200 to $+1000$, the virtual length of the target steadily increases according to some not very simple law. We have already seen from Fig. 5 that the virtual length of the target for $d = +500$ is greater than the actual length of the ship. Fig. 8 shows that this is not universal for all values of d. It is only true if d is greater than about -600 feet for the particular case here being dealt with. Below this value the virtual length of the target is really less than the actual length of the ship.

It may appear almost incredible at first sight that the virtual length of the target can ever be less than the actual length of the ship. But such is the case, and here again we can state that this is a general result. Whatever may be the value of l, s, v and r, there is always some value of d below which l_v is less than and above which l_v is greater than l. This value of d is always negative. The explanation of the paradox is simple.

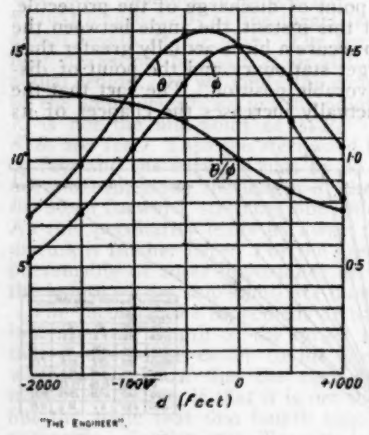


FIG. 7

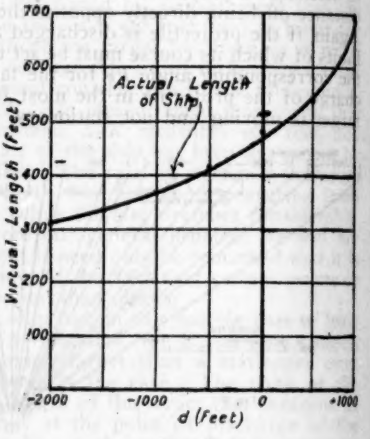


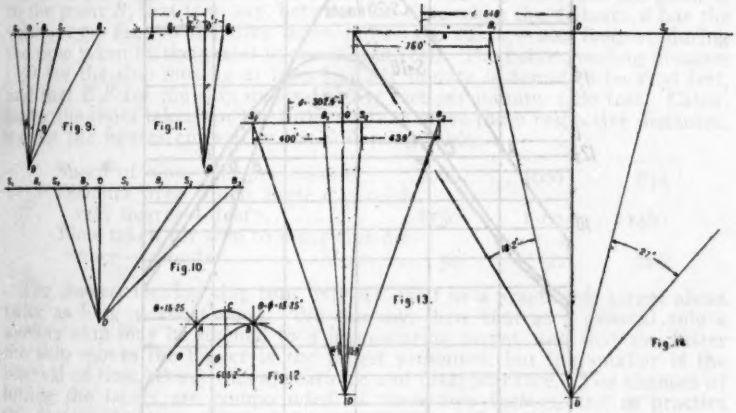
FIG. 8

In Fig. 10, on the right-hand side of $O\,D$, the distance $D\,B_3$ is essentially greater than the distance $D\,S_2$, so that the distance $B_1\,B_3$ is essentially greater than the distance $S_1\,S_2$. Hence, as $S_1\,B_1 = l$, the distance $S_2\,B_3$ must be greater than l and bow the B_1 reaches its torpedoing position B_3 some time *after* the stern S_1 reaches its torpedoing position S_2. On the left-hand side of $O\,D$, $D\,B_3$ is essentially shorter than $D\,S_2$, so that $B_1\,B_3$ is essentially less than $S_1\,S_2$. Hence, $S_2\,B_3$ must be less than $S_1\,B_1$ or l. The bow B_1 in this case reaches the torpedoing position B_3 some time *before* the stern S_1 reaches its torpedoing position S_2.

An Important Deduction.—As a deduction from what has just been said, we see at once that if $D\,B_3$ is equal to $D\,S_2$ then $B_1\,B_3$ must be equal to $S_1\,S_2$, so that $S_1\,B_1$ must be equal to $S_2\,B_3$ or $l = l_v$. But $D\,B_3$ and $D\,S_2$ can only be equal when the angle $S_2\,D\,B_3$ is bisected by the the normal line $O\,D$. Hence, to find graphically the position at which the virtual length of the target is equal to the actual length, we proceed as follows: Lay off $O\,B_3$ and $O\,S_2$ on each side of O, as shown in Fig. 11, making each equal to $l/2$. Lay off backwards the distances $B_3\,B_1$ and $S_2\,S_1$ each equal to $1/n$. $D\,B_3$ where n is the ratio of the two speeds, v/s. Bisect $S_1\,B_1$ at M. Then $O\,M$ is the value of d for which the virtual length of the target is equal to the actual length of the ship. It is, of course, obvious that $d = S_1\,S_2 = B_1\,B_3$.

It is important to carry this matter a step further and arrive at a mathematical expression for this value of d. In Fig. 11 we have $D B_3 = \sqrt{(r^2 + l^2/4)}$. Hence, $d = B_1 B_3 = -s/v \sqrt{(r^2 + l^2/4)}$. Filling in the values used in connection with Fig. 6 we find that the exact value at which the virtual length of the target is equal to the actual length of the ship is in this case -605.2 feet, as compared with about -600 feet as read from the curve given in Fig. 8.

The Maximum Training Angle.—It is clear from Fig. 11 that for $d = -605.2$ feet the angle θ, or $S_2 D B_3$, is equal to the angle which we have called F_3, in this case 15.25 degrees. We know from Fig. 9 that θ has also this value when d is zero. Fig. 12 is a reproduction of the maximum portions of the curves for θ and ϕ given in Fig. 7. At the points A and B, θ is equal to F_3, these two points corresponding respectively to $d = -605.2$ feet and $d =$ zero. If the curve for θ is symmetrical about its maximum ordinate then the maximum ordinate must occur half-way between A and B, for these are two symmetrical points on the curve. A rigorous proof that the curve is symmetrical is at present wanting, but if we assume that



it is at least symmetrical between the points A and B, whatever it may be on either side of this range, then the result still holds good; the maximum value of the angle θ occurs when the distance d is one-half of the value it has when the virtual length of the target is just equal to the actual length of the ship. Expressed mathematically, the angle θ is a maximum when $d = -1/2\ s/v \sqrt{(r^2 + l^2/4)}$. In our example, then, the maximum value of θ occurs when $d = -302.6$ feet. The diagram—Fig. 6—does not include the construction for this value of d. To avoid confusion, we give the construction separately in Fig. 13. The maximum value of θ is found by actual measurement to be 15.8 degrees.

With the information given above, it is an easy matter to find the maximum valne of the angle θ and the value of d at which it occurs, for any given set of data without going through the tedious process of construction and graph-drawing, illustrated in Figs. 6 and 7. Thus with the data, $l = 760$ feet, $s = 25$ knots, $v = 30$ knots, $r = 2000$ feet, we find by the formula given that θ is a maximum for $d = -848$ feet.* Applying this, we get the construction shown in Fig. 14, from which the maximum value of the angle θ is found to be 27 degrees.

It will, no doubt, be noticed that both in Fig. 13 and Fig. 14, in spite of the wide differences in the data, the angle $B_1 D S_2$ is apparently bisected

* The quantity under the square root sign can readily be found graphically.

by the normal line *O D*. This circumstance will be commented upon later, when further evidence has been accumulated.—*The Engineer*, 28/6.

MOVING TARGETS AND TORPEDO ATTACK NO. II.—*Effect of Varying the Speed Ratio.*—Our first investigation will be to discover how the general results are affected by variations in the ratio of the two speeds. Using the same values as formerly for the length of the ship and the normal range, 400 feet and 1500 feet respectively, the writer has worked out diagrams corresponding to Fig. 6, first for the case of $v/s = 1\frac{1}{4}$, and, secondly, for $v/s = 3$. If the speed v of the torpedo be taken as 2500 feet per minute, as we supposed it to be in connection with Fig. 6, we are thus enabled to trace out the effect of changing the speed of the ship from 1000 feet per minute to a lower speed—833 feet—and to a higher speed—2000 feet—while the other variables, l, v and r remain constant.

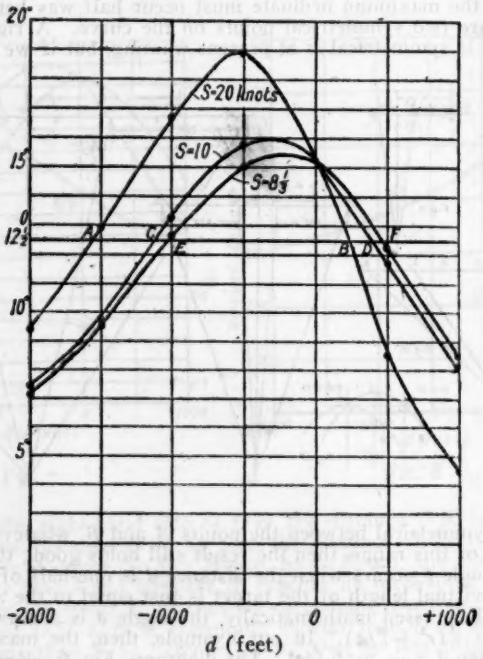


FIG. 15.

Without reproducing the actual diagrams corresponding to Fig. 6, we give in Fig. 15 curves showing the value of the angle θ for the three cases. If it is more difficult to hit a quickly moving target than one of the same size moving slowly, it might well be supposed that it is so because the angle θ between the limits of which the course of the projectile must be trained decreases as the speed increases. From Fig. 15 it will clearly be seen that this is only so if the discharge of the projectile is delayed until the distance d becomes positive. For $d =$ zero the angle θ is, as we have already stated it to be, constant, no matter what the speed of the ship and the speed of the torpedo may be. But if d is negative, the angle θ is always greater for a swiftly moving ship than for the same size of ship moving slowly. In particular, the values of the three maximum angles may be noted. Determined

by aid of the formula established, these angles are: For $s = 833$ feet per minute, 15.4 degrees; for $s = 1000$ feet per minute, 5.8 degrees; for $s = 2000$ feet per minute, 18.9 degrees.

Is it true, then, as the left-hand portions of the curves seem to suggest, that it is really easier to hit a ship when it is moving quickly than when it is moving slowly? Practical experience tells us that it is not true. The explanation is that the magnitude of the training angle is not the sole criterion whereby to judge the easiness or difficulty of hitting a moving target. The element of time comes into the matter to a most important extent.

It will readily be understood that it is in general not worth while firing a torpedo at a ship if the training angle is less than some value. If the training angle is very small, the chances of hitting the target are correspondingly reduced. In fact, if the training angle is less than a certain amount, it may be said, for practical purposes, that no target exists. Let us suppose merely for the sake of illustration, that this limiting value of the angle θ is 12½ degrees. In Fig. 15 the vessel moving at 2000 feet per minute subtends an angle equal to, or greater than, 12½ degrees from the point A to the point B, that is to say, between the time when the distance d has the value—1550 feet to the time when it has the value + 200 feet, or during the time taken by the vessel to move 1750 feet. The corresponding distance $C D$ for the ship moving at 1000 feet per minute is found to be 1500 feet, and that $E F$ for the ship moving at 833 feet per minute, 1480 feet. Calculating the times taken for the three ships to move these respective distances, we get the figures entered in the following table:

Speed of ship, feet per minute.....	2000	1000	833
Distance over which angle θ exceeds 12½ degrees—feet	1750	1500	1480
Time taken for ship to move this distance—seconds	52	90	106

The slowest moving ship thus exposes itself as a practicable target about twice as long as the fastest. We can say, then, that as a general rule a moving ship may be likened to a disappearing target, and that the faster the ship moves the bigger is the target presented, but the smaller is the interval of time between its appearance and disappearance. The chances of hitting the target are compounded of these two factors, and in practice the factor of time—affecting our opportunity of taking aim—more than outweighs the factor of size—affecting the limits within which our aim must be made.

In torpedo practice the speed of the target also affects the matter in another way. All our calculations so far have been based on the assumption that the speed of the torpedo is constant over all the varying lengths of ranges covered, or alternatively, that the *average* speed of the torpedo over these ranges is constant. Thus in connection with Fig. 6 we have assumed that the average speed of the torpedo over a range of 1500 feet—the shortest range involved—is not different from the average speed over a range of 2750 feet—the greatest range to which the construction has been carried in the diagram. If the average speed is not constant, then our entire treatment becomes misleading. To determine the magnitude and position of the training angle under these conditions is impossible, unless we know how the speed falls off as the journey of the torpedo proceeds, and even with this knowledge the determination involves so much complexity that it may be ruled out of practical consideration. In fact, in practice, if the speed of the torpedo is not constant, the training of its course to secure a hit is a matter not for calculation but for guesswork. In practice, however, the speed of the torpedo is substantially constant if the range does not exceed a certain maximum. If the range involved for the torpedo exceeds this amount, the average speed of the missile is dependent on the range itself, calculation of the magnitude and position of the training angle

becomes virtually impossible, and the target for practical purposes may be said to have disappeared.

We do not know what this limit of range is for a modern torpedo, but purely for illustrative purposes let us assume it to be 2640 feet. That it is really more than half a mile is certain, but this figure is a convenient one to choose in connection with Fig. 6 and the two corresponding diagrams referred to above, but not here reproduced. It will be seen from Fig. 6 that all the ranges involved for the torpedo between $d = -2000$ and $d = +1000$ are within the "constant speed distance" of 2640 feet, except the extreme right-hand one, which amounts to 2750 feet, and corresponds with a hit on the bow of the ship when $D = +1000$ feet. If the speed of the ship is reduced to 833 feet per minute it is found that all the ranges involved for the torpedo between $d = -2000$ and $d = +1000$ are within the constant speed distance. If, however, the speed of the ship is increased to 2000 feet per minute it is found that the ranges for the torpedo, if $d = +500$, and still more so if $d = +1000$ feet, are well over the constant speed distance.

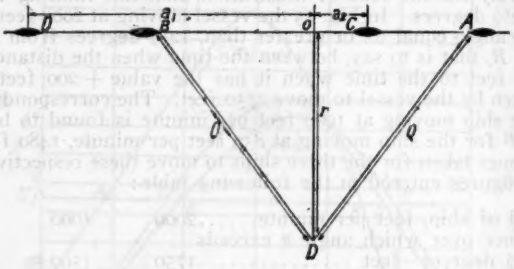


FIG. 16.

It is easy to find by a graphical process the exact values of d corresponding to the points at which the target "appears" and "disappears." Thus in Fig. 16 with center D and radius equal to the "constant speed distance," cut the ship's course at the points A and B. From A lay off backwards the distance $AC = s/v \cdot Q$, and from B lay off similarly BD equal to the same proportion of the constant speed distance Q. Then the stern of the ship will just be struck at A if it is at C when the torpedo is discharged, and the bow will just be struck at B if it is at D when the torpedo is discharged. The values of the distances d_1 and d_2 are so easily expressed mathematically that it would be a mistake to omit doing so. Thus:

$$AO = BO - \sqrt{(Q^2 - r^2)}$$
$$AC = BD = s/v \cdot Q.$$
$$\text{Hence } d_1 = \sqrt{(Q^2 - r^2)} + s/v \cdot Q + l/2,$$
$$\text{and } d_2 = \sqrt{(Q^2 - r^2)} - s/v \cdot Q + l/2.$$

Consequently $d_1 + d_2 = 2\sqrt{(Q^2 - r^2)} + l$, so that the actual interval of time elapsing between the "appearance" of the bow of the target at D and the "disappearance" of its stern at C is given by $t = [2\sqrt{(Q^2 - r^2)} + l]/s$. These are all general expressions. For the particular data we are now using they give the following numerical results:

$l = 400$ feet. $r = 1500$ feet. $Q = 2640$ feet. $v = 2500$ feet per minute			
s (feet/minutes)	833	1000	2000
d_1 (feet)	3252	3428	4484
d_2 (feet)	1492	1316	260
$d_1 + d_2$ (feet)	4744	4744	4744
t (seconds)	341	285	144

It will be seen then that the *length* of the danger zone, DC in Fig. 16, is the same for all three speeds. It depends solely on the magnitude of the "constant speed distance" Q, the normal range r, and the length of the

ship l, and is quite independent of the speed either of the ship or the torpedo. On the other hand, as the speed of the ship increases that portion d_1 of the danger zone lying to the left of the normal point O increases, while the portion d_2 to the right decreases. In other words, as the speed of the ship increases the danger zone remains constant in length, but shifts further and further over to the left. If the speed of the ship is sufficiently great—2247 feet per minute for the present data—d_2 becomes zero, so that it will be useless firing at the ship at any time after its mid-point has reached the normal point O.

An increase, then, in the speed of the ship does not reduce the length of the danger zone, but it does reduce the time taken by the ship to pass across this zone. This, of course, is a very important advantage to the ship, for it means less time for the attacking vessel to make the necessary observations, and curtails the opportunity for the discharge of a second torpedo if the first should miss.

The fact that the speed of the torpedo cannot be depended upon to remain constant over ranges in excess of 2640 feet results in the danger zone for the fastest of our three ships being situated between the points $d = -4484$ feet and $d = +260$ feet. The fact that it is not worth while firing at a ship unless the training angle for the torpedo is in excess of 12½ degrees results, as shown in connection with Fig. 16, in the danger zone for the same ship being situated between the points $d = -1550$ feet and $d = +200$ feet. The figures 2640 feet and 12½ degrees, we must again point out, are not to be taken as a true indication of modern practice. They have no official justification, and are probably grossly in error. We use them merely for illustrative purposes. But whether they are wrong or right, the point remains that between them they limit the magnitude of the danger zone. It seems probable that in actual practice the left-hand limit of the danger zone is always settled by the magnitude of the least practicable training angle, and that the right-hand limit is sometimes settled by the angle and sometimes by the magnitude of the "constant speed distance." It may be pointed out that the least practicable training angle and the constant speed distance are not necessarily independent. Thus a simple graphical extension of the process illustrated in Fig. 16 shows us that if the constant speed distance is 2640 feet, then for $l = 400$ feet, $r = 1500$ feet, $v = 2500$ feet per minute, and $s = 2000$ feet per minute, the least practicable training angle is about 16.5 degrees. If the training angle is less than this one or both of the sides enclosing it will exceed the constant speed distance. Similarly for $s = 1000$ feet per minute, the other data being unaltered, the least practicable training angle is 8.5 degrees, and for $s = 833$ feet per minute it is 7.6 degrees. These figures relate to the torpedoing of the ship to the right of the point O. Whether they apply equally to the case of the ship torpedoed to the left of this point has not been investigated. Our object is merely to show that the constant speed distance limits the value that may be assigned to the least practicable training angle. Interpreted in practical terms this implies that improved means of training the course of a torpedo, and of holding it to that course after it has been discharged, may lose much of their value unless the distance which the torpedo can run without losing speed is simultaneously improved.

Effect of Varying the Length of the Target.—Of the two remaining variables, namely, the length l of the ship and the normal range r, we will deal first with the influence of the length. In Fig. 17 we give three curves showing the value of the training angle θ over the range $d = -2000$ to $d = +1000$ for three ships having lengths of 400 feet, 600 feet and 800 feet respectively, the normal range r in each case being 1500 feet, and the speed ratio s/v being constant at 2/5. It will be seen that, as is to be expected, an increase in the length of the target increases the size of the training angle at every point throughout the range. The increase, however, is not constant. Thus at $d = -2000$ feet, and also at $d = +1000$ feet, doubling the length of the target very approximately doubles the value of the training angle, but in the neighborhood of $d = -300$ feet—the critical

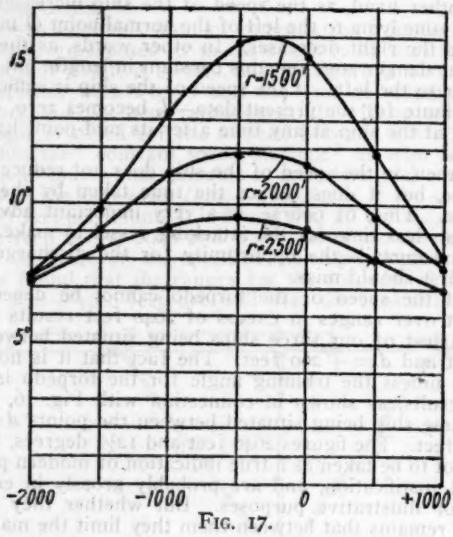

15°
10°
5°
r-1500'
r-2000'
r-2500'
-2000
-1000
0
+1000

FIG. 17.

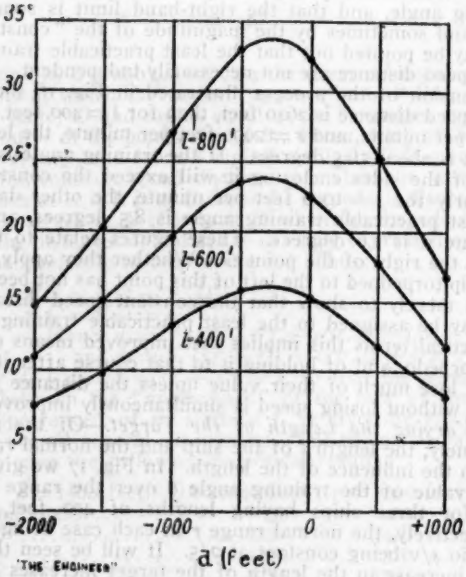

35°
30°
25°
20°
15°
10°
5°
t-800'
t-600'
t-400'
-2000
-1000
0
+1000
"THE ENGINEER"
d (feet)

FIG. 18.

neighborhood for the given data—doubling the length of the ship more than doubles the size of the training angle. It will be noticed also that the curves reach their maxima practically at the same value of d, namely, somewhere at about $d = -300$ feet. The following table gives the exact figures:

$r = 1500$ feet	$s/v = 2/5$		
Length of ship (feet)	400	600	800
Distance, d, giving maximum value of training angle θ (feet)	−302.6	−306	−310.4
Maximum value of training angle θ	15.8°	23.5°	33.8°

We see, then that for practical purposes the position at which the maximum training angle is given may be regarded as independent of the length of the target, but that the value of such maximum training angle is very materially affected by the length of the target. It is also to be noted that the increase in the size of the training angle due to an increase in the length of the ship becomes most marked just at the most dangerous point in the ship's course. Other considerations being neglected, this amounts to a plea for small ships.

Effect of Varying the Range.—The last variable with which we have to deal is the normal range r. The influence of variation in this dimension on the size of the training angle is illustrated in Fig. 18, for the case of a 400-foot vessel having a speed equal to two-fifths that of the torpedo. It will be gathered that the length of the range affects, for practical purposes, the size of the training angle only if the distance d lies between two values —approximately in our example −2000 feet and +1300 feet—but that between these two values its influence is very marked. Between the two points referred to, the training angle very naturally decreases as the range increases. The range has also a very perceptible influence, not only on the training angle at all values of d between −2000 feet and +1300 feet, but also on the size of the maximum training angle and the position at which it occurs. The following table gives the data involved:

$l = 400$ feet.	$s/v = 2/5$		
Range (feet)	1500	2000	2500
Distance, d, giving maximum value of training angle θ (feet)	−302.6	−401.8	−501.6
Maximum value of training angle θ	15.8°	11.8°	9.5°

—*The Engineer*, 5/7.

MOVING TARGETS AND TORPEDO ATTACK NO. III.—*Some Practical Considerations.*—Having thus discussed the theory of moving targets as exemplified by torpedo attack against ships, let us now consider a few practical aspects of the matter.

Our theory has taken account of three variables, namely, the speed ratio s/v, the length of the target l, and the normal range r. Given an accurate knowledge of these quantities, we are enabled by our graphical process to discover the limits and absolute position of the training angle corresponding to any position of the ship on its course. In practice, the speed v of the torpedo, it may be assumed, is known with a fair degree of accuracy by those discharging it. The length l of the ship may, or may not, be definitely known. If the ship is a unit of the navy of an opposing Power, it is probable that her length will be known as soon as her identity has been established. Failing this, the length of the target can frequently be judged within fairly narrow limits by simple inspection of the type of ship presented to attack. In any event, the limits between which the lengths of ships vary are not so wide apart as to permit of much scope for making a serious error in judging the length of a particular target. The speed of the ship is a more troublesome factor to deal with than its length. Even though the identity of the ship is established, difficulty is introduced by reason of the fact that the speed of a ship is variable under the will of those on board and under the influence of the weather and tides. Again, however, there are certain fairly definite limits between which the speed of any particular target may be assumed to lie.

When we come to consider the question of the range r, we notice at once that in practice it is bound up with another important variable that our theory has so far assumed to be known, namely, the *direction* of the ship's course. This point is illustrated in Fig. 19. We may measure the range $D\,M$ from the point of discharge of the torpedo to the mid-point of the ship's length, but without a knowledge of the size of the angle ψ between the line $D\,M$ and the ship's course, we cannot determine either the normal range r or the all-important distance d. It will be seen at once, however, that a knowledge of the actual range $D\,M$—or R, to give it a symbol—and of the angle ψ is sufficient to enable us to determine the normal range r and the distance d and so to pass to the complete solution of the problem.

Summing up, then, the following table indicates the data required for the solution of the problem and the extent to which under practical conditions the data are available:

1.	Speed of torpedo	Known.
2.	Length of target	Frequently known accurately and usually known between fairly narrow limits.
3.	Speed of target	Generally unknown accurately, but usually known within limits.
4. and 5.	Normal range, r and Position of target on its course, i. e., distance d	Both r and d are known, if actual range R and angle ψ of ship's course are known; for $r = R \sin \psi$ and $d = R \cos \psi$.
6.	Actual range R	Determinable by a range finder.
7.	Angle ψ of ship's course	Generally wholly unknown.

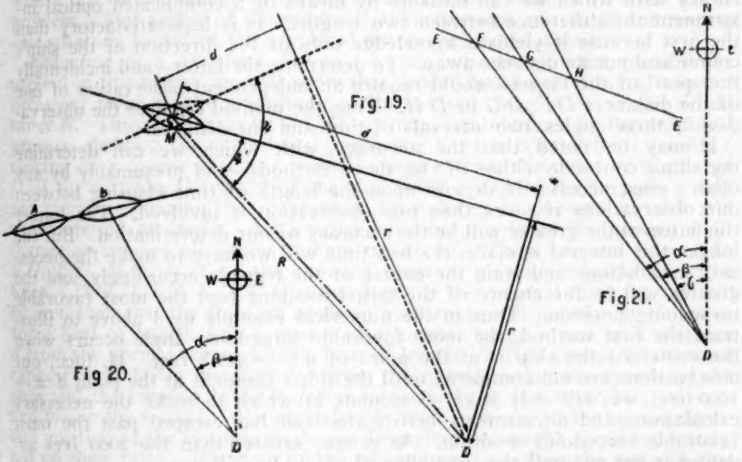
A Torpedo Directing Instrument Required.—The practical problem, it will be seen, depends for its successful solution upon a number of factors concerning which there is likely to be much doubt, or even entire ignorance on the part of those responsible for the discharge of the torpedo. We are divulging no secret when we state that at present there are in existence no practical satisfactory means of solving the problem mechanically, and that an instrument or combination of instruments is earnestly desired that would enable a submarine commander or other officer executing a torpedo attack to determine by observation the exact course along which to train the torpedo in order to hit a given moving target.

It is easy to lay down the ideal requirements of such an instrument. Thus it should permit the collection of the necessary data by means of a *single* observation. The taking of this observation should not entail the submarine coming above the surface. At most, it should require the elevation and withdrawal of a periscope-like body. The maximum time allowable for the elevation of the observing apparatus, the taking of the observation and the lowering of the apparatus is very short, if the submarine is to have a reasonable chance of escaping detection, and should not exceed, say, about four or five seconds. The height to which the observing apparatus may be elevated above the surface is for a similar reason very restricted, and should not exceed, say, five feet.

The ideal manner in which the instrument should operate may be stated to be as follows: The observation sight and the discharge of the torpedo should be separated by a reasonable interval of time, in order to permit the correct course of the torpedo to be determined, and the torpedo tube—that is, the submarine as a whole—to be trained in the required direction. This means that the observation should permit the determination of the course of the torpedo to obtain a hit when fired after the target has reached some point on its course ahead of the position occupied when the observation is made. The "observation sight" must, therefore, be followed by a "watching sight," in order that the progress of the ship as it approaches the point where the torpedo should be discharged may be noted.

Whether or not an instrument or combination of instruments fulfilling the above requirements can be devised is a question we leave the ingenious reader to answer. That there are many practical difficulties in the matter is certain. The instrument required is, apparently, something more than a range-finder. It is primarily, we may at this stage assume, a combined range-and-course finder, but to serve its purpose completely it should be a speed-finder as well. It may be remarked that the problem of devising and fitting even a simple range-finder on board a submarine has not yet been solved in an altogether satisfactory manner. Such types as have been tried generally have failed, because they betray to an undesirable degree the presence of the submarine using them.

Some Possible Methods of Operation.—In order to assist the evolution of the desired instrument we may direct attention to certain miscellaneous results of our theoretical treatment that seem to have some possible bearing on the matter. We will deal first with possible means of determining the range and course of the ship.



It might be thought that given a satisfactory range-finder these two items could be determined simultaneously by taking two observations of the range at some interval of time, together with contemporaneous observations of the bearing of the target. Thus if we measure, in Fig. 20, the distance DA and the angle α and at some interval of time later the distance DB and the angle β, we have, theoretically, at least, sufficient data to enable us to lay down the course of the ship, both as to its direction and its distance from the point of observation. In addition, we have also got sufficient data to enable us to calculate the distance AB, and therefore the speed of the target. In practice, however, objection is found to this method of procedure because (1) it requires the observation of two angles, two distances, and an interval of time; and (2) because it makes the accuracy with which we can lay down the ship's course dependent upon the accuracy with which we can determine the *difference* between two large and fairly equal quantities, namely, the two lengths DA and DB. To give a numerical illustration, let us take the case of a 10-knot 400-foot ship on a course lying at a normal distance of 2000 feet from the point of discharge of the torpedo. Then when the center of the ship is at the point $d = -1500$ feet, the distance DA—Fig. 20—is 2500 feet. When the ship's center is at the point of $d = -1000$ feet, as it will be half a minute later, the distance DB is 2236 feet. The determination of the ship's course is dependent not on

the absolute value of these figures, but on their difference, so that the accuracy of the determination is dependent upon how accurately we can measure a distance of 264 feet when we are not permitted to approach it closer than 2236 feet. It may be remarked that in this particular case the estimated course will be one degree out of truth for every 10 feet of error made in estimating the distance of 264 feet.

An alternative method is to take three observations of the ship's bearing at equal intervals of time. Let the three angles obtained be α, β and γ, as shown in Fig. 21. Then on the assumption that the ship has been sailing in a straight line at a uniform speed during the interval between the first and third observations, we can find the direction of her course by laying down a line $E\,E$ across the three bearing lines such that the intercept $F\,G$ is equal to the intercept $G\,H$. The method is an improvement on the first in so far as it makes the accuracy of the determination of the ship's course dependent upon the accuracy with which we can measure the difference between two angles that can be directly sighted instead of upon the accuracy with which we can measure by means of a complicated optical instrument the difference between two lengths. It is less satisfactory than the first because it yields a knowledge only of the direction of the ship's course and not its distance away. To determine the latter—and incidentally the speed of the target—would require an independent observation of one of the distances $D\,F$, $D\,G$ or $D\,H$. Thus the method requires the observation of three angles, two intervals of time and one distance.

It may be noted that the accuracy with which we can determine the ship's course by either of the above methods—and presumably by any other—must necessarily depend upon the length of time elapsing between our observations if more than one observation is involved. The longer this interval the greater will be the accuracy of our determination. But the longer this interval is made, the less time will we have to make the necessary calculations and train the course of the torpedo accordingly, and the greater will be the chance of the target escaping past the most favorable torpedoing position. Thus in the numerical example used above to illustrate the first method, the most favorable torpedoing angle occurs when the center of the ship is at the point of $d=-401.8$ feet. If, then, our observations are not completed until the ship's center is at the point $d=-1000$ feet we will only have 36 seconds in which to make the necessary calculations and adjustments before the boat has escaped past the most favorable torpedoing position. At ranges greater than the 2000 feet assumed in the example the time allowed would be still less.

The basis of a third possible method will now be examined. For any given ship on a given course the angle ϕ—see Fig. 4—subtended by the ship at the point of discharge of the torpedo is a function of the normal range r, the distance d, and the length l, of the ship. It can, in fact, readily be shown that the value of ϕ is given by $\tan=lr/(r^2+d^2-l^2/4)$. Now, it is obvious from Fig. 19 that $r^2+d^2=D\,M^2=R^2$. Hence, $\tan\phi=lr/(R^2-l^2/4)$. If, then, we measure ϕ and R and know the length of the ship, we can determine the normal range r from the formula:

$$r=\frac{(R^2-l^2/4)}{l}\tan\phi,$$

and having found r in this way we can determine d from the formula $d=\sqrt{(R^2-r^2)}$. It is conceivable that an instrument could be devised whereby ϕ and R could be measured simultaneously. To lay down the course completely we would also require the instrument to measure not only the length of the line $D\,M$—Fig. 19—but also its bearing. Thus this method involves the measurement of two angles and a length. It is very distinctly an improvement on either the first or second method in so far as it should be possible by it to acquire a complete knowledge of the ship's course and the ship's position on that course by means of one observation instead of by two or three observations respectively. It suffers, however,

from two disadvantages: (1) the accuracy of our determination depends upon how accurately we know the length of the ship, and (2) the method does not permit us to discover the speed of the target. If it were possible to take a second similar observation at a known interval of time after the first, it would be also possible to determine the length of the ship and its speed. But this would nullify at once the advantage possessed by the method in its dependence upon a single observation and would necessitate the determination of four angles, two lengths and one interval of time.

In investigating other possible methods of determining the ship's course from the point of discharge of the torpedo it is to be borne in mind that after all the really essential information sought is the magnitude of the angle relatively to the north and south line at which the course of the torpedo must be trained to obtain a hit when fired at a given instant. All else is merely a means to that end, and the more incidental determinations we can cut out of the process the better it will be. The question therefore arises as to whether under any given conditions it is possible to dispense with a precise knowledge of certain of the variable factors involved in the problem. This aspect of the matter is attractive and affords an interesting field of study by aid of the graphical process advanced above.

Reduction to a Standard Range.—As an indication of the possibilities present in this matter we will show that, under certain conditions, it is not necessary to know the magnitude of the normal range r or of the actual range R. Thus, in Fig. 22 let $A\,G\,D$ be a diagram, obtained by the graphical process, showing the torpedoing position $J\,K$ of a boat $A\,B$ of length l, moving on a course $A\,G$ at a normal range r from the point of discharge D of the torpedo, the speed of the ship being s and of the torpedo v feet per minute. Imagine the diagram to be reduced to one-nth its size and superimposed on itself. All lengths have been reduced to one-nth their former value, but all angles remain unaltered. Therefore the lines $E\,D$, $F\,D$, $L\,D$, $M\,D$, $H\,D$ of the reduced diagram coincide exactly with the lines $A\,D$, $B\,D$, $J\,D$, $K\,D$, $G\,D$ respectively of the original diagram. It will be seen then that the training angle in magnitude and position is the same for a boat of length l on a course at a normal range r, and at a distance d from the normal point, as for a boat of length l/n on a course at a normal range r/n, and at a distance d/n from the normal point, the speeds of the ship and the torpedo being s and v respectively in the first case, and s/n and v/n in the second. We have already seen, however, that the magnitude and position of the training angle are dependent not on the speed separately, but on their ratio. The ratio of the two reduced speeds is the same as that of the two original speeds. Hence we have this result: the magnitude and position of the training angle for a boat of length l on a course at a normal range r, and at a distance d from the normal point, are the same as for a boat of length l/n on a course at a normal range r/n, and at a distance d/n from the normal point, the speed of the ships in both cases being s and of the torpedoes v.

This theorem seems to be of considerable practical importance, for it permits us, under certain conditions, to reduce our calculations to a standard basis. Thus in Fig. 23 let $A\,B$ be a ship of unknown length sailing with a known speed s on a course $E\,F$, the direction of which is known, but of which the normal distance from the point of discharge D of the torpedo is unknown. To find the magnitude and position of the training angle under these conditions we need only measure the angles α and β, and then proceed to carry out the graphical construction on the assumption that the range r is, say, 1000 feet, or any other convenient distance. The exact procedure would be as follows: Draw $D\,G$ perpendicular to the course $E\,F$. Lay off $D\,H = 1000$ feet and draw $J\,K$ through H parallel with $E\,F$. Lay down the lines $D\,A$, $D\,B$ according to the determined values of the angles $\alpha\,\beta$. Then proceed to carry out the graphical construction on the assumption that we have to torpedo a boat of length $L\,M$ moving with speed s on the course $J\,K$. The magnitude and position of the training angle thus found will also be the magnitude and position of the training angle for the actual ship $A\,B$.

If, then, we know the speed of the target and the direction of its course we can find the correct course of the torpedo by taking two angular observations In other words, given these conditions we do not need to determine either the length of the ship or its range, normal or otherwise. This is apparently a very simple procedure, but in reality its simplicity springs from our assumption that the direction of the ship's course is known. In practice it must only be on rare occasions that the direction of the course is definitely known without taking observations. To find the direction of the course by observation is the usual condition, and as this determination must, or so it would seem, involve in some way or other a determination of the range, our theorem really succeeds in eliminating only the two unknown quantities l and d, both of which are readily found if the range is known. On the other hand, if it should be possible to find a means of determining the direction of the course without measuring any range our theorem shows that the range need not enter into our calculations in any other direction. That is an important deduction, for it narrows the field of search for the instrument sought.

Attack Within the Maximum Training Angle.—Another promising subject for investigation centers around the properties of the maximum train-

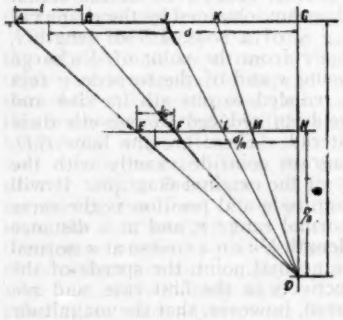


FIG. 22.

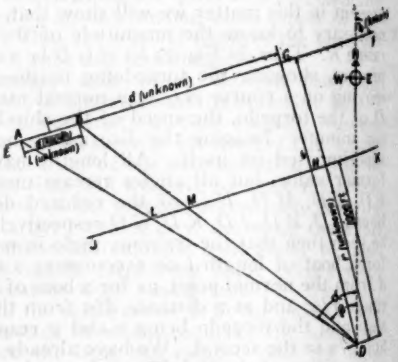


FIG. 23.

ing angle. Referring back to Figs. 13 and 14, it will be recalled that we commented upon the fact that in both cases the line $D\,O$ appeared to bisect the angle $B_1\,D\,S_2$, although the data in the two cases were entirely different. It is to be observed that this angle $B_1\,D\,S_2$ is of very considerable importance. The line $D\,B_1$ is a line of direct sight, for B_1 is the actual instantaneous position of the *bow* of the ship. The line $D\,S_2$ is that along which the torpedo must be discharged at this instant to obtain a hit on the *stern* of the ship. Hence, if we know the magnitude of the angle $B_1\,D\,S_2$ we have a means of training the course of the torpedo with, as basis, a definite line of sight $D\,B_1$. This is a point of very great practical value, for it frees us entirely from dependence on compass readings and imaginary Datum lines.

A thorough investigation of the matter shows that the maximum training angle value of d, namely $d = -\frac{1}{2}\,s/v\,\sqrt{r^2 + l^2/4}$, does not accurately result in the angle $B_1\,D\,S_2$ being bisected by the normal line $D\,O$, but that it is for all ordinary practical conditions very approximately so bisected. There is, of course, some value of d that does result in the angle $B_1\,D\,S_2$ being exactly bisected by the line $D\,O$, and with but little trouble it can be shown that this value is given by

$$d_1 = -\frac{\sqrt{[4\,v^2/s^2(r^2 + l^2/4) - r^2]} - l/2}{4\,v^2/s^2 - 1}\,.$$

It is by no means obvious that this expression yields results that are in close agreement in general with those obtained from the expression $d_2 = -\frac{1}{2} s/v \sqrt{[r^2 + l^2/4]}$. To what extent they are in agreement can be judged from the following table:

v/s.	l (feet).	r (feet).	d_1 (feet).	d_2 (feet).	$d_1 - d_2$.
2/5	400	300	95	100	— 5
2/5	400	2000	402	404	— 2
2/5	400	8000	1625	1604	+ 21
2/5	100	2000	406	400	+ 6
2/5	400	2000	402	404	— 2
2/5	600	2000	400	405	— 5
2/5	400	2000	402	404	— 2
4/5	400	2000	839	808	+ 31
5/5	400	2000	1096	1005	+ 91

It will be seen then that, except when dealing with very fast ships, or very great ranges, the discrepancy between d_1 and d_2 is practically negligible. The question arises: How can we take advantage of this fact in practice?

In Fig. 24 let $S B$ be a ship of length l moving along the course $A C$ with speed s, and let D be the center of the torpedoing vessel lying at a

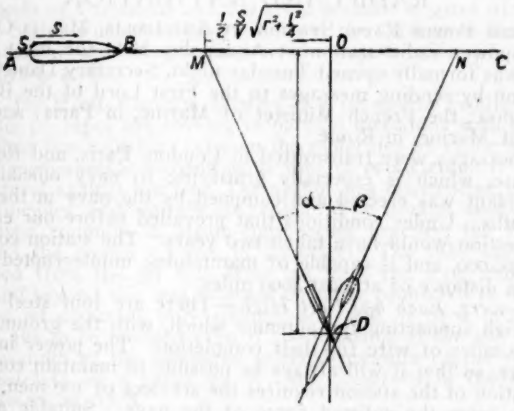


FIG. 24.

normal distance r from the ship's course. Let the sighting apparatus of the attacking vessel be set relatively to the line $D O$ at an angle α given by $\tan \alpha = \frac{1}{2} s/v \sqrt{(r^2 + l^2/4)}/r$. Let the center line of the torpedo-tube be trained at an angle β equal to α but on the opposite side of $D O$. Then if the torpedo is discharged at the instant when the mid-point of the ship is observed to pass across the line of sight along $D M$, a hit will be obtained at N on some point of the ship very close to its mid-point.

Everything here depends upon our being able to find the value of α, and to determine the position of the datum line $D O$. As regards the value of α it is to be noted that

$$\tan \alpha = \frac{1}{2} \frac{s}{v} \sqrt{\frac{r^2 + l^2/4}{r^2}} = \frac{1}{2} \frac{s}{v} \sqrt{\left(1 + \frac{l^2}{4r^2}\right)}.$$

Now even though the range were no greater than the length of the ship, the second term under the square root sign would be small. In fact, if

$r = l$ then tan $\alpha = \frac{1}{2} s/v \times 1.118$. As the range increases the error involved in assuming that α is given by tan $\alpha = \frac{1}{2} s/v$ becomes increasingly small. Thus for $l = 400$ feet and $r = 2000$ feet we have tan $\alpha = \frac{1}{2} s/v \times 1.005$. It may therefore be taken that, for all but quite exceptional cases, tan $\alpha = \frac{1}{2} s/v$, an expression involving only one unknown, namely, the speed s of the target.

As regards the determination of the datum line $D O$ we note that once again we require to know the direction of the ship's course before we can fix the point O, but that the determination of the range r is unnecessary except in so far as such determination may be essential towards obtaining a knowledge of the direction of the ship's course. Assuming that the speed of the ship and the direction of its course are known then we can fix the position of the datum line $D O$ and calculate the magnitude of the angle α. It will be noticed that, instead of training the course of the torpedo at an angle α relatively to the datum line, we can train it at an angle 2α relatively to the much more concrete line of sight $D M$.

Conclusion.—In conclusion, it may be remarked that we have in no wise exhausted the possibilities of the subject, and that many other practical aspects of it as revealed by the aid of the graphical process deserve, and should receive, careful study.—*The Engineer*, 28/6.

RADIO AND NAVIGATION

NEW HIGH-POWER RADIO STATION AT ANNAPOLIS, MD., IS OPENED.—The new high-power radio station at Annapolis, Md., the most powerful in America, was formally opened Tuesday night, Secretary Daniels signalizing the occasion by sending messages to the First Lord of the British Admiralty, London; the French Minister of Marine, in Paris; and the Italian Minister of Marine, in Rome.

These messages were transmitted to London, Paris, and Rome with the utmost ease, which is especially gratifying to navy officials, since this powerful plant was erected and equipped by the navy in the short space of 10 months. Under conditions that prevailed before our entry into the war its erection would have taken two years. The station completed cost about $1,500,000, and is capable of maintaining uninterrupted communication over a distance of at least 4000 miles.

Four Towers, Each 650 Feet High.—There are four steel towers, each 650 feet high supporting the antennæ which, with the ground system, required 160 miles of wire for their completion. The power installations is in duplicate, so that it will always be possible to maintain communication. The operation of the station requires the services of 100 men, all of whom are drawn from the enlisted force of the navy. Suitable provision has been made for the protection of the station.

Completion of the station gives still another guarantee of continuous communication abroad, even in the event of any possible interruption of the cable service.—*Official Bulletin*, 12/9.

TELEGRAPHY THROUGH THE GROUND.—Some months ago interest was excited in France by a report that the German Army is using a method of communication known as "telegraphy through the ground." The method appears to be a compromise between wireless and one-wire telegraphy. The two communicating stations are not connected by wire. According to *Le Matin*, a wire is placed along the fighting front with both ends extending into the ground, and current from a Rhumkorff coil or kindred apparatus is conveyed along it. Installed parallel to this wire, and some distance in advance of it is another similar wire, in which current is induced by the first, thus permitting the sending of signals. The method is thus broadly similar to wireless, except that the ground forms the medium instead of the air. One would imagine, however, that although the method has the advantage that there are no intervening wires to be cut, it would be a very simple system to tap.—*Scientific American*, 31/8.

ENGINEERING

PLANT TO MAKE CARBOCOAL IS ESTABLISHED IN VIRGINIA.—The Fuel Administration, issues the following:

Following tests made of Carbocoal by the United States Navy and two railroads, the United States Government has become interested in the establishment of a plant for the manufacture of the product, at Clinchfield, Va. The plant, which is now in the preliminary stages of construction, will have a capacity of treating several hundred thousand tons of bituminous coal annually. The plans for the plant and grounds allow for an eventual capacity of 1,500,000 tons per year.

New Process of Distillation.—By a new process of low-temperature distillation, bituminous coal is treated in such a manner as to recover greater quantities of the valuable by-products, such as toluol, sulphate of ammonia, and valuable oils. From the residue is made a valuable smokeless fuel, in the form of briquettes. Tests of Carbocoal by the navy disclose that it contains less than 4 per cent volatile matter, rendering it practically smokeless. Moreover, it is found to work satisfactorily where there is limited grate area and restricted boiler capacity.

Plant near Clinchfield.—The new plant, which is expected to be in operation early in 1919, is being built near the junction of the Carolina, Clinchfield & Ohio and Norfolk & Western Railways. On account of the successful tests of Carbocoal and the great promise it gives of saving fuel, the United States Fuel Administration and the Ordnance Bureau of the War Department are co-operating in the construction of the plant.—*Official Bulletin*, 27/8.

PARALLEL JET HIGH-VACUUM PUMP.—If a jet can be produced in which the molecules of vapor are moving in parallel directions with nearly equal velocities, then few collisions between the molecules of vapor would occur. Further, a gas molecule moving with the jet could enter it readily, but could not travel against the jet. The author has constructed pumps based on these principles, and entirely air-cooled. The nozzles used were of the divergent type common in steam-engineering practice, the throat being 0.24 cm. and the mouth 1.3 cm. in diameter. The tube into which the vapor passed from the jet was from 2.5 to 5 cm. long and 2.5 cm. in diameter, and beyond this was a larger chamber connected to the auxiliary pump. The jet disperses only silghtly, and will, if of a proper density, entrain the gas to be pumped even if the pressure of the gas is not more than a thousandth of the computed internal pressure of the jet.—Note in Science Abstracts on a paper by W. W. Crawford in the *Phy. Rev.*—*Scientific American*, 17/8.

A TWO-CYCLE SUPER-INDUCTION GAS ENGINE FOR THE AUTOMOBILE.—During a recent test an automobile equipped with a rotary gasoline engine now developed to the commercial stage, was driven from Buffalo, N. Y., to Toronto, Ontario, a distance of 137 miles, on less than one quart of oil and with an average fuel consumption better than 20 miles to the gallon. In a word, that tells what are the possibilities of the new engine.

The inventor of the rotary automobile engine used in the above-mentioned test is Benjamin F. Augustine of Buffalo, N. Y.

The new rotary engine, which is illustrated in the accompanying photograph and drawings, is claimed to be 100 per cent scavenging, whereas the majority of internal combustion engines in common use cannot get better scavenging than 30 per cent; and with the remainder of smoke left in the cylinders the incoming gas combines with the smoke and causes a great waste of fuel, not to mention the creation of carbon which soon causes trouble and has to be removed. The Augustine engine runs at high speed, is mounted on a two-point suspension, and since there is no reversal of the piston, there is no vibration. The engine can be built within two pounds per horse-power, which means that it is well suited to airplane work.

The rotary engine is equipped with a magneto and also an electric starter. It has a simple mixer to supply the fuel. It air-cools itself while in action; and as it rotates the bearings, shaft and oil are kept cool by the incoming charge. The fuel is transferred to the inner chamber where the moist fuel is carried by centrifugal force to the inner walls of the pistons and vaporized to dry gas, being pre-heated before it is admitted to the cylinders. As the engine rotates the exhaust ports open first followed immediately by the inlet ports which allow the dry gas under pressure to drive all burnt gases out of the cylinder through the exhaust ports, this "uniflow" action preventing cycloning and effecting a 100 per cent scavenge, according to Mr. Augustine.

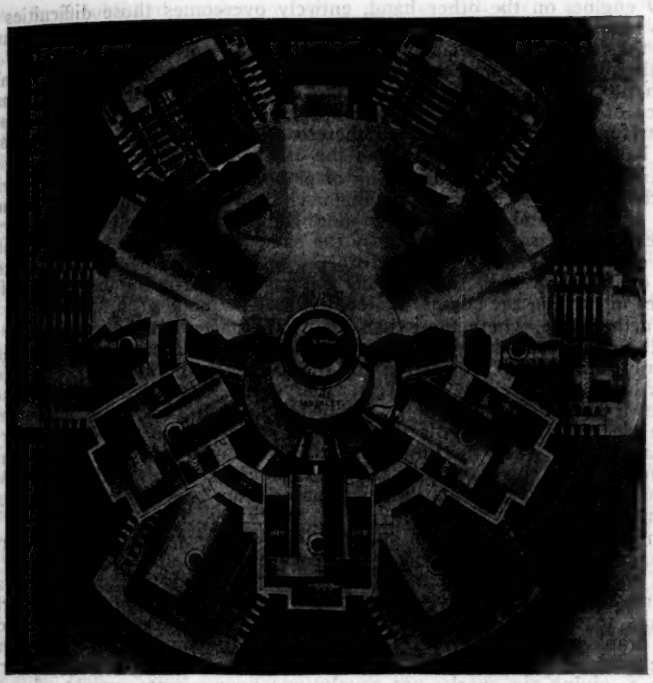
There can be no waste of fuel since the exhaust ports are closed at a fixed time before the inlet ports, and the charge is regulated by the throttle. The large area of the fuel pumps supplies the "super-induction" charge for each revolution.

The new engine is started by turning on the switch of the magneto, pressing the button of the self-starter, and the cylinders get into motion. To stop the engine, the switch is turned off and all the cylinders charge themselves with fresh fuel from the inner chamber and are ready for the next run. The engine can be started with a coil and battery if desired. The engine is made reversible by simply adding a sleeve to reverse the inlet and transfer ports, thereby making it reversible like an ordinary steam engine.

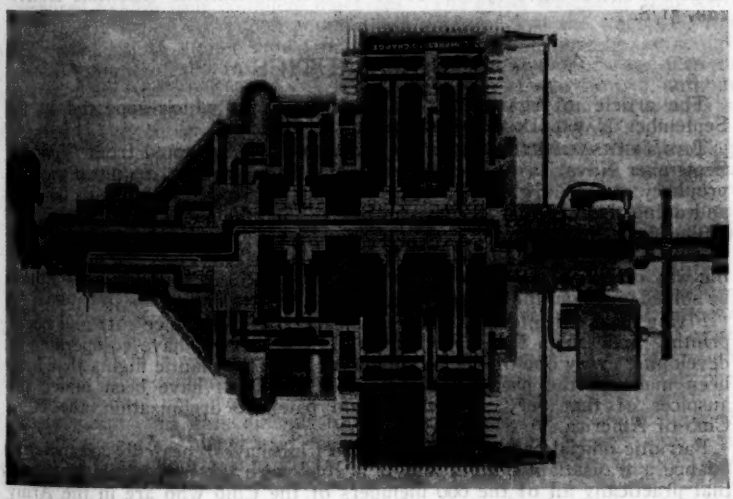
Easy operation is claimed for this prime mover. It is practically foolproof for the reason that there are no adjustments to be made; the ignition is in regular sequence as the cylinders successively pass the ignition point; there is only one commutator wire from the magneto to the brush; the firing order of the cylinders is 1, 2, 3, 4, 5, and 6 in revolution, giving a perfectly constant torque. By the perfect control of the oil supply and the complete scavenging the formation of carbon in the cylinders, as already stated, is prevented, placing this engine in a class by itself. Indeed, this engine operates with a steady torque that is quite suggestive of the electric motor, at all speeds. This is all the more noticeable when the engine is installed in a car and is throttled down to two miles per hour; for then, with the slightest touch of the throttle, the engine responds and the car moves along at a high rate of speed without the slightest jar or vibration.

The fuel gas is drawn from the carburetor by pumping devices and delivered to the crank casings where it is put under slight compression. The degree of compression is controlled by the throttle condition of the carburetor. The fuel gas passes directly from the crank casings to the cylinders, entering through intake ports at the inner ends of the cylinders, and the burnt gases are expelled through large exhaust ports at the outer ends of the cylinders. These exhaust ports are controlled by a sleeve which is positively moved, and the sleeve is timed to close the exhaust ports prior to the closing of the intake ports. This effects super-induction of the fuel gases. It is well known that all airplane motors up to this time obtain only about thirty-five per cent efficiency at high altitudes, and this is due largely to the small volume of fuel gas taken into the cylinders by reason of the low atmospheric pressure. By the super-induction brought about in the Augustine engine through the closing of the exhaust ports and the large pumping capacity which can deliver a large volume of gas to the cylinders, a very high volumetric efficiency is obtained even at these high altitudes.

Another feature which has to be contended with in the rotary type of engine is the centrifugal force which becomes an enormous factor in a high speed engine. One piston has been balanced against another, but in the present engines the expansion force of the gases against the outer end of the piston is not only constantly working against centrifugal force but throws the centrifugal force on the opposed pistons out of balance. The



SECTIONAL END VIEW OF THE ROTARY ENGINE.



SIDE VIEW THROUGH CENTER OF ENGINE, SHOWING THE MAIN COMPONENTS.

new engine, on the other hand, entirely overcomes those difficulties and this is accomplished by arranging the expansion and compression chamber for the fuel gases so that the expanding gases work against the inner face of the piston, forcing the same outward and pulling on the fixed crank to turn the engine rather than thrusting against the crank. The expanding force of the gas against the piston operates in the same direction as the centrifugal force and is added thereto and does not in any way destroy the balance of one piston against the other.

Another essential feature in an airplane engine is extreme light weight. In the Augustine engine each cylinder is divided by the piston into a pumping chamber and an expansion and compression chamber for the fuel gases. The gases are pumped by the same piston which is acted upon by the expanding gases and therefore the piston is double acting. By using the one cylinder both for pumping the gases and for the expansion of the gases in turning the engine, the engine may be made very light.

Furthermore, where the expansion of the gases is against the inner end of the cylinder and the crank casing, while the outer end of the cylinder is only subjected to the suction and the discharge of the gases, the cylinder may be made extremely light. In other words, the force of the expanding gases is practically taken up by the piston head and the crank casing itself. The sleeve which controls the exhaust ports is also timed to cover the exhaust ports when the outer end of the cylinder operates as a pumping chamber, and this not only prevents the loss of the fuel gases being pumped, but also prevents the burnt gases from being drawn back into the pumping chamber.

In conclusion, the general specifications of the Augustine engine are as follows: Number of cylinders—six, each having double-acting piston utilized both as power piston and pump; bore of working cylinder is equivalent in area to 4⅝ inches conventional piston; stroke, 4 inches; area of working piston, 16.7 square inches; area of pump, 23.76 square inches; connecting rod crank ratio, 4 to 1; bore of crank case, 10¼ inches; overall diameter of engine, 26 inches; overall length, 24 inches; two-spark magneto driven 3 to 1, giving six sparks per revolution; approximate weight of engine, two pounds per horse-power; compression from 90 to 100 pounds per square inch; positive system of force-fuel lubrication.—*Scientific American*, 31/8.

AERONAUTICS

The article in regard to a transatlantic flight which appeared in the September NAVAL INSTITUTE PROCEEDINGS is denied.

THE TRANSATLANTIC FLIGHT (referring to article quoted from *Flying* in September Naval Institute Proceedings).—These are not so much days of prophecy as they are days to clearly define and visualize things to be done and doing them as fast as they can humanly be done.

The first step towards accomplishing the things that should be done is to define the value of the achievements, then the plans and the problems in the way of carrying out the plans. When this is done the problems should be solved and then the plan tested by putting it into effect.

Flying has been interested in the transatlantic flight since 1911 and began printing articles on the subject in 1912. Our editors have co-operated in developing every one of the serious plans for transatlantic flights that have been made in the past six years, most of which have been under the auspices of that very progressive and patriotic organization, the Aero Club of America.

Patriotic officials and members of the Club have repeatedly arranged to finance a transatlantic flight and if a vote were taken it would be found that practically all of the 600 members of the Club who are in the Army and Navy Air Service are anxious to pilot the machine when the flight is made.

We have published articles in *Flying* dealing with every aspect of the project to fly across the Atlantic and have told, as far as we could without publishing information of value to the enemy, just how the problems can be solved, giving, as much as permissible, the results of the work of the scientists who have been working with the Aero Club of America in solving this problem.

We had taken all the steps to be taken and there only remained to test and plan an actual flight, but as this counld not be done *by us within 30 days* we decided to test the plan by printing the account of an hypothetical flight, which we did in the August number, hoping in this way to bring out any possible flaw there may be left in the plan as proposed.

The result was most amazing. Inquiries, hundreds of them, came by telephone, by cable, telegraph, and mail—and the visitors were equally numerous.

Some were relieved and some were sorry to learn that the flight had not actually been made, and the story was only a test. But not a single objection was brought forth to show that the flight could not have been made, and in every case the final verdict was that *"it should be made."*

One of the additional reasons for wanting the flight made was brought out in a War Department report dated August 17, which dealt with the problem of shipping aeroplanes, part of which read as follows:

"The shipment of our American-built aeroplanes has become a problem. It involves the transportation of an immense aggregate weight, and demands a great amount of space. Planes and their accessories are so delicately constructed that they require careful packing and strong boxing, and the boxes must be so built that they may be taken apart on the field without injuring the units, and used for repacking again, like a wardrobe trunk.

"Studies of the plane boxing and shipping problem have resulted in a material saving of lumber and shipping space. In shipping the American De Haviland bombing planes alone, for example, 644 cubic feet of space have been saved, over former methods, for every plane sent. This amounts to a cost saving of about $3864 per plane, figuring on shipping space at $6 per cubic foot. About 1000 board feet of lumber have also been saved in boxing by the Packing and Boxing Section of the Production Department."

"In the case of the De Haviland battleplanes, nine packing boxes are required to ship four complete machines. The gross weight of four aeroplanes is a little over 11,000 pounds, and when packed the total weight is estimated a little under 27,000 pounds. Four of the nine boxes contain front sections of the fuselage. One of them contains four rear sections, two contain two sets of wings each; one, four sets of rear control, and one, four sets of ailerons. The total space required for four aeroplanes so crated is 3547 cubic feet."

This reminds us that large bombing machines of the super-Handley-Page and super-Caproni types occupy about 220 ship tons each. But an offer has been made to deliver them across the Atlantic for $2500 each. Lack of sufficient tonnage will force the United States to fly them over—and it will be found that it will be cheaper and safer to fly them over than to ship them over!—*Flying*, Sept., 1918.

AERIAL DREADNOUGHT CARRIES 20 PERSONS.—London, Eng., August 17.—The air ministry authorizes the publication of the following description of the British aerial dreadnought. Many pictures have been published of the Handley-Page airplanes, some details of whose great size and weight, standing at rest in an airdrome, suggest an enormous black grasshopper.

Seated right out in the nose of the machine, the pilot looks small and insignificant, and it is difficult to believe him capable of controlling the weighty mass of planes and machinery behind him. Before him is the cockpit, from which bombs can be released. At his side sits the observer or mechanic. To reach the front seats it is necessary to climb up a ladder under the body of the machine and then scramble through a trapdoor. There is plenty of room to move about inside, although much space is taken

up by the bomb store. By securing the bombs inside no extra wind resistance is offered during flight, which is a notable advantage.

Behind the bomb case there is a space which might be called a cabin. Here is accommodation for several gunners and guns. To convert this place in peace time to a passenger saloon, seating a dozen persons, would be a simple task.

Each engine has a little house to itself on either side of the main body. Petrol is pumped to the engines from two huge tanks fixed above the bomb case. A special motor tractor is employed to move the monster craft about on the ground.

The Handley-Page is an extraordinary easy airplane to fly. The present model was designed expressly for war purposes. The possibilities of its peace uses have to be imagined. The fact that it has already flown over Constantinople and lifted over 20 persons to a height of 7000 feet give some idea of what it may achieve in the future.—*Evening Star*, 7/8.

OUR GIANT BOMBING PLANES.—Speaking recently on the nation's aircraft program, John D. Ryan, Federal Director of Aircraft Production, announced that the United States now was producing airplanes weighing 15 tons and equipped with four motors of the Liberty type. Mr. Ryan intimated that the larger types of bombing planes would be made in the United States, but that the smaller scouting and battleplanes would continue to be manufactured overseas.—*Scientific American*, 24/8.

A FOUR-ENGINED GOTHA.—A giant German airplane recently brought down in France had the following characteristics: Four engines; span, 136 feet; length over all, 66 feet 6 inches; crew, number not definitely known. The correspondent of the Havas Agency on the French front telegraphs that another giant German airplane which was brought down on June 1 in the neighborhood of Retz (southwest of Soisson), carried nine passengers, including the pilot officer commanding, two observer officers and machine gunners, two specialist engineers, a second pilot in charge of the engines, and two other specialist engineers. The machine is of the most recent type of giant airplanes. Its principal characteristics are as follows: Four motor engines, each of 300 horse-power; spread of wings, about 141 feet; total length, about 92 feet; crew, nine men; weight (when empty), over nine tons; weight in flight, when fully loaded, 14½ tons; weight of bombs that can be carried, about two tons; maximum speed, 75 to 80 miles an hour; armament, four machine guns.—*Scientific American*, 24/8.

ENMESHING ENEMY NIGHT RAIDERS.—It now appears quite certain that both the Germans and the French are making extensive and regular use of aerial nets to bag enemy night raiders. Sometime ago the use of captive balloons and aerial steel nets was reported as being tried by the Germans, in an effort to enmesh British airmen. More recently reports have come from France telling of the use of aerial nets at certain points which are frequently passed by the methodical German raiders. Indeed, it is even said of these nets that the German airmen, fearing nothing so much as an encounter with the slender steel web in the blackness of night, have been greatly discouraged in their work. On the other hand, a recent item in *l'Aerophile* tends to cast doubt on the efficacy of the aerial nets employed in the defence of Paris.—*Scientific American*, 24/8.

AIRPLANE AMBULANCES FOR ALL FLYING FIELDS.—Airplane ambulances to carry injured aviators quickly from the scene of an accident to a field hospital are to be provided at all flying fields.

Successful experiments with the ambulance plane at Gerstner Field, Lake Charles, La., led to their introduction at the nine Texas fields, and the War Department announced to-day that all field commanders had been instructed to follow the example.—*Evening Star*, 26/8.

TEST FLIGHT OF LEONING'S MONOPLANE.—The first flight of a two-seater monoplane designed and built by Grover C. Leoning, the aeronautical engineer and contractor, at his factory in Long Island City, was made at the Amry Aviation Field at Mineola on August 4th. While details of the construction of the machine and the flight are not available for publication, it is claimed that the construction is such that the pilot has an unusually large radius of vision and the gunner has practically no "blind spots." It is stated that the unique design of the machine has overcome the well-known drawbacks of the monoplane in strength and vision and that in flight the machine showed low landing speed, and exceptionally good stability. It is claimed, continues *Aviation*, that the simple design of this machine permits its construction with about one-tenth of the number of parts of the ordinary machine. It is powered with a 300-horse-power Hispana-Suiza engine.—*Scientific American*, 7/9.

AIRCRAFT RESEARCH.—*Work of the Physical Laboratory.*—Valuable research work in aeronautics is described, among other things, in the report for 1917-18 of the National Physical Laboratory, which is published by H. M. Stationery Office (price 2s. 6d. net), and of which a fuller account will appear in *The Times Engineering Supplement*, published to-morrow. This is the first report to be issued since the Laboratory became a government institution under the Department of Scientific and Industrial Research. The Royal Society still has the direction of the scientific work.

A very large program of research in aerodynamics has been carried out during the year. The work has been of the most varied character, including experiments on models of all types of aircraft, with a number of investigations relating to special matters. Tests have been made on models of aeroplane wings, both monoplane and biplane models of complete aeroplanes, airship and kite balloon models, models of aircraft with calculations relating to stability, strength of construction, bomb-dropping, etc. A considerable number of the investigations were made in response to specific requests from the Air Ministry.

Describing the new aeronautics building and the gauge workshops which are under construction, the report states that two 7-foot channels are at present available for aeronautics research, in addition to two 4-feet and one 3-feet channel. During recent years the use of the larger channels, with higher wind speeds, has been found to be of increasing importance, and, in view of the great number of investigations demanding attention, the Air Ministry has arranged for the provision of two additional channels. A new airscrew balance for use in a 7-foot tunnel is in hand, and a new apparatus for lift measurement is now in use.

Research work on aluminum and other light alloys has also been devoted to the immediate needs of aircraft construction. A great part of the work has been carried out in direct co-operation with the Light Alloys Sub-Committee of the Advisory Committee for Aeronautics. A considerable amount of theoretical investigation has also been carried on, leading to the establishment of a number of constitutional models of ternary alloys of aluminum with other metals.

Other important war work has included the testing of clinical thermometers, large supplies of which are required for the army. It is understood that it will shortly be made compulsory that no clinical thermometer shall be sold unless it has passed the Laboratory test. During the year 5140 clinical thermometers were tested for the trade. This number is small compared with the tests in normal years—which numbered between 16,000 and 18,000. The decrease is explained by the facts that the government now absorb a very large proportion of the country's output and that practically none are now exported. Last year 22,300 samples were tested for the War Office. The number of clinical instruments tested for the Ministry of Munitions since the end of June, 1917, is 122,650.

In regard to certain instruments required by the navy for operations against submarines, it is stated that these are to a large extent being produced by firms without previous experience in the manufacture of goods of this kind.

The restrictive effect of the war on the number of watches sent in to the Laboratory for the Class A trial continues. The first place in a trial of 42 watches obtaining the distinction "especially good" was taken by M. Paul Ditisheim, La Chaux-de-Fonds, Switzerland, with a keyless lever, which obtained 96.2 marks, the highest yet recorded.—*London Times*, 15/8.

THE LIBERTY AERO OIL WHICH MEETS THE REQUIREMENTS OF AVIATION.—The Department of Military Aeronautics has announced the specifications for a new aircraft engine oil, known as the Liberty aero oil, developed while the lubrication branch was a part of the Equipment Division of the Signal Corps. The new oil is a mineral oil, and will be used in the Liberty engine, as well as all stationary aircraft engines both here and abroad by the army and navy. Its development is due to the energy and skill of a staff of men who have worked exclusively on the problem for upward of twelve months. One officer so exhausted himself by his devotion to the subject that he became ill and died. The name of this officer was Captain O. J. May.

When the aircraft program was announced in 1917, no one in authority had a definite idea as to the proper kind of lubrication required. Both at home and abroad the practice has been far from uniform. For nearly every engine there was a specific oil.

An airplane is useless without an engine, and in turn the engine powerless without oil. Some engineers insisted on castor oil mixed with mineral oil; still others wanted mineral oil alone. At that time it was estimated that 5,000,000 gallons of castor oil alone, at about $3.00 per gallon, would be required. Neither that amount nor any amount of any other oil was available.

A new American engine was being designed and new lubrication problems were continually arising. Those in authority set out to develop a suitable lubricant at an average cost of about 75 cents per gallon and also a system for reclaiming oil already used. The result was the beginning of an oil survey.

Among the first lubrication experts attached to the new department was Captain May, of Chicago. In 25 days he supervised personally the running of 37 engine tests in a laboratory where five engine tests a week would be a complete program. These engines were run with different kinds of oil, and each oil was analyzed and measured before and after tests. This work consumed a great amount of vitality and required such ceaseless vigil that the endurance of the investigator was exhausted when the work was completed. To determine how lubrication and fuel would serve at high levels, Captain May then went to the altitude testing laboratory, an air-tight building capable of having the air within it partly exhausted and kept in that state. In other words, the air pressure within this compartment could be reduced and kept constant by means of exhaust air pumps. In this manner the reduced air pressure could be made equivalent to the air pressure at any elevation. Here the engines were tested for altitude, instead of trying to fly them for any length of time at the corresponding heights, or taking them up to the top of some mountain.

In the first tests Captain May ran a 65-hour test without a stop. He stood watch without leaving the work until it was finished and his data was recorded. This continued strain on his vitality proved too great and on an inspection trip shortly afterward he was caught in a severe storm, fell ill, and died at Tacoma Park, D. C., on May 22d last.

On Captain May's reports were based the Liberty aero oil specifications which are in general use in the army and navy to-day. His experiments

made possible the securing of a suitable airplane engine oil at about a fourth the price of castor oil, saving the government perhaps $11,000,000. Reclamation of used oil is also practiced now and at least 50 per cent is used again, whereas previously it was thrown away. This probably also saves the government several million dollars.—*Scientific American*, 7/9.

PARACHUTES FOR AIRPLANES.—Balloon observers are equipped with parachutes for emergencies, and it seems a very unpatriotic omission to leave them from the aviator's equipment. The value of a trained aviator for military purposes is considerable, because of the cost of the training received and of his services.

The two usual occurrences which fatally finish a flight are, that the airplane is shot down out of control, or falls because of defective parts in its construction. In either case, the aviator has no chance to escape, but with a parachute to depend on, he would, through using it in such an emergency, still be able to render the valuable services for which he was trained, the only loss being the machine.

It may be that the aviators would regard parachutes with contempt, or be prompted by pride to regard them as cowardly to use. Still, safety devices are used on shipboard and wherever else it is necessary to use them, the patriotism of their adaptation to airplanes being centered in the fact that, if the airplane is lost, the man can yet do damage to the enemy when furnished with a new machine.

Another objection which may arise is that the aviator might use the parachute and let a perfectly good airplane be wrecked. This would be due to indecision or lack of confidence on the part of the aviator; but that sort of man does not have such faults of character, and it is perfectly obvious that he knows when his machine is out of control.

Why not use a little more common sense and do this for the greater protection of the eyes of our army?—C. W., *Scientific American*, 24/8.

CHAIN OF LANDING FIELDS FOR AIR PILOTS ACROSS CONTINENT.—The War Department authorizes the following:

A chain of landing fields for the accommodation of air pilots is being steadily built across the continent. In a few States they already await the flyers at intervals of 100 miles.

When completed, these well-marked, safe landings will be to air pilots like water tanks to transcontinental locomotive engineers, or harbors to marines. Besides oil and gas, the majority of the fields will supply to the pilots shelter and limited machine-shop facilities, maps, charts, and barometer and thermometer ratings. New York, Pennsylvania, Ohio, Illinois, District of Columbia, Georgia, Texas, and California have already established lines of such landing fields. Arkansas, Mississippi, Alabama, New Mexico, and Nebraska will soon be equipped.

Value of Landing Fields.—The value of permanent landing fields sufficiently close together to establish well-defined air routes across country was early established in the development of training United States flyers, and hereafter will no doubt enter largely into the location of future training fields. Flying by compass has since become an established practice, but landing fields, like beacon lights, help the pilot to pick his course, even though he has his compass. Most of the landings to-day are on army fields, but local boards of trade, chambers of commerce, and business men's associations in rival cities and towns have began to compete for the location of sites.

Movement Gaining Momentum.—Reports to the Division of Military Aeronautics from field officers indicate that this movement, like that which started good roads, is steadily gaining momentum, and it is confidently predicted that before another year has elapsed any aviator with an ordinary powered plane will be able to make a transcontinental flight without difficulty or inconvenience.—*Official Bulletin*, 26/8.

PROBLEMS IN FLYING AT HIGH ALTITUDES.—Translated from the French of W. Krasperowicz, by Augustus Post.—The influence of low atmospheric pressure at high altitudes is a most important factor to consider in the construction of aeroplanes and dirigibles to navigate the higher regions of the atmosphere, and we may look at this question from different points of view, for the reduced pressure of the air causes the following change in conditions:

(1) Static and dynamic support of dirigibles and aeroplanes;

(2) The resistance to their progress;

(3) The regulation of the motor and the amount of energy which the motor exerts—this influence is extremely important from a military point of view because it changes the tactic and strategic value of an aeroplane.

It is also necessary to consider the two following problems:

(1) The influence of flying at high altitudes upon the aviators (the physiological effect);

(2) The offensive and defensive possibilities of an aeroplane flying at a high altitude.

First, we must know the effect of lowering the pressure of the air and we will give the following table, which states the relation between the pressure of the air and altitude, approximately, from the sea level. The pressure is stated in millimeters of mercury:

Altitude	Pressure in mm. (mercury)	Pressure in Atmospherics
1000	675 mm.	1 atm.
2000	500	
3000	515	
4000	450	
5000	400	½ atm.
6000	350	
7000	310	
8000	270	⅓ atm.

Thus, if you rise to 5000 meters, the pressure of the air is reduced to the half of that at the level of the sea. And at 8000 meters to one-third of an atmosphere. This gives us two problems to solve:

(1) To find the best condition to fly at an altitude of 5000 meters, which is ordinarily accessible by aeroplanes;

(2) To determine, if flying at higher altitudes of 6000 and 8000 meters, what to do to increase the efficiency.

The speed of the aeroplane depends, among other things, upon the resistance of the air. When the resistance of the air becomes less with altitude an aeroplane should fly at greater speed than at the sea level. But this is not true, because, although the pressure of the air is diminished, the power of the motor is also decreased, and the machines are not calculated ordinarily for these special conditions of flying at high altitudes. Neither the motor nor the supporting surfaces, nor the propellers are built for the low pressure. Thus it follows that the ordinary aeroplane does not gain by lowering the resistance of the air, and it is necessary to build machines with special propellers and supporting surfaces, calculated for the lower pressure and high speed. This is the principal point of the problem, to construct special motors whose power will not diminish at high altitudes. Then we will have machines which will give a greater speed at the high altitudes. No doubt machines can be built on the lines indicated, which will have a speed of one and a half times the speed at 5000 and 6000 meters that they have at sea level and twice the speed at 7000 and 8000 meters.

The quantity of explosive mixture entering the motor diminishes proportionately with the lowering of the pressure, in those motors which are constructed for running at sea level. Motors should be made to take

in an equal volume of explosive mixture at different altitudes. For instance, the contents of the cylinders may be 10 liters at ordinary pressure, but the density of mixture depends upon the pressure of the air and we give a table which gives approximately the relation between the pressure of the air at different altitudes and the relative density of the mixture:

Altitude	Pressure	Density of mixture
0 meters	1 atm.	10
1000		9
2000		8
3000		7
4000	½ atm.	6
5000		5.2
6000		4.6
7000		4.0
8000	⅛ atm.	3.5

Thus we see that the motor of an aeroplane or dirigible of modern construction of 200 horse-power under normal conditions, is subject to a change in the proportion of air and the explosive mixture. And at 5000 meters, on account of the reduced atmospheric pressure to one-half an atmosphere, it gets only one-half of the explosive mixture calculated for the power of the motor, and the compression is half of the sea level pressure which reduces its power proportionately. The cooling of the cylinders is more rapid and the revolutions are less, caused by the slower combustion and the lower compression. Thus we see that motors of aeroplanes built for flight at sea level are not adapted for high altitude, and they lose at 5000 meters half of their normal power. And at 6000-8000 meters they lose all the advantage of the high altitude's decreased resistance because the power furnished by the motor falls to a proportionately less amount.

The solution of this problem is based upon adapting the motor to give its full power: by enriching the explosive mixture or increasing its density. We may be able to design an attachment to the motor which will keep the power of the motor unaffected by the decrease in the pressure. The most simple methods are: (1) increasing the quantity of the explosive mixture by means of an auxiliary compression; that is, to introduce into the cylinders a greater quantity of mixture than ordinarily taken in by the action of the piston; (2) to enrich the explosive mixture by introducing oxygen or acetylene, or both. These auxiliary substances do not have to be employed in their pure state, but mixed with the air or the gasoline.

This is equally true for motors for aeroplanes or those used in dirgibles. In the construction of an aeroplane for flying at high altitude we must consider the following problems:

(1) The construction of the motor to give the full power irrespective of the altitude and the reduced pressure of the air;

(2) Construction of the propellers for reduced pressure of the air and the high speed with regard to the appropriate surface and size;

(3) The construction of supporting surfaces designed for low pressure and high speed of the machine. We must also choose a construction for an intermediate region, which will give the maximum efficiency at low altitudes;

(4) The construction of a special cockpit for the pilot which will allow him to secure a proper amount of oxygen to breathe and, if necessary, to maintain an interior pressure of 600 millimeters of mercury, even though the external pressure is much less.

The problem of aerial navigation at high altitude is very interesting, and it will no doubt result in the construction of motors especially adapted for all the exceptional conditions which are present in these high regions of the atmosphere.—*Flying*, 18/9.

MERCHANT MARINE

EMERGENCY REPAIRS TO AN ARMORED TRANSPORT.—One of our armored transports, the *Dix*, while on a voyage between San Francisco and the Philippine Islands, and when about four days out from Honolulu, had the misfortune to break her stern bearing and lose her propeller. A wireless message was sent to Honolulu, and a relief ship set out from that port and brought her back for repairs. The only possible facilities at the port were the floating drydock which was used in making emergency repairs on the Japanese cruiser *Azuma*, an account of which appeared in the *Scientific American* of October 13, 1917.

On this occasion, as on that, the ship was too large for the dock, which measures 300 feet over all, the *Dix* being considerably over 400 feet long. Manifestly it was impossible for a dock displacing 4500 tons to lift a ship weighing over twice as much. But it was not necessary to raise the whole weight. The trouble was at the stern, and if that could be lifted clear of the water the repairs could be made.

So the dock was submerged and the ship backed into it, until the stern was flush with the cantilever foot-bridge. As much weight as possible was shifted towards the bow of the *Dix*, which, of course, projected far beyond the opposite end of the dock, and the dock was pumped out. The result was that, the bow being water-borne, the dock had sufficient buoyancy, when empty, to lift the stern clear of the water.

A working platform was suspended from the foot-bridge, and first the shaft bearing, then the hub and finally the propeller blades, were put in place.—*Scientific American*, 24/8.

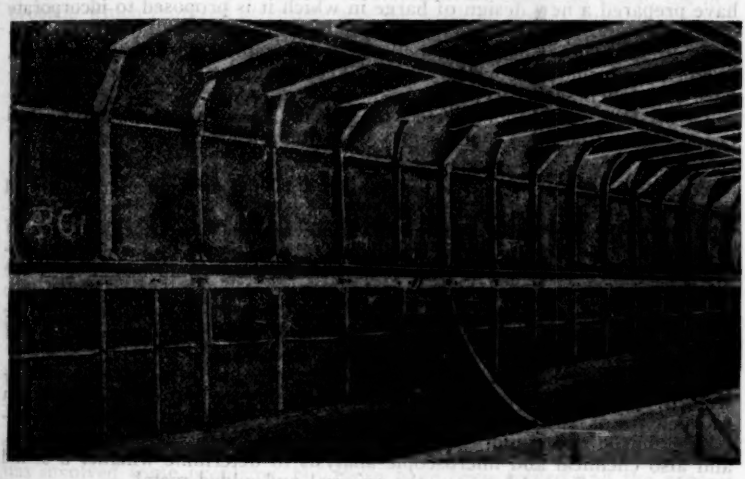
AN ELECTRICALLY-WELDED SHIP.—*Description of First Vessel Constructed Without Rivets.*—Particulars are now available of the interesting, and completely successful experiment in rivetless shipbuilding, carried out at a yard on the southeast coast. The first steel vessel constructed entirely without rivets was recently launched in the presence of Lord Pirrie, the Controller-General of Merchant Shipbuilding, and other representatives of the Admiralty and the War Office. She has since been in service with full cargo during exceptionally rough weather, answering satisfactorily in every way to the severe tests imposed.

The object of the experiment, to which considerable importance was attached by shipbuilding authorities, was to prove the ability of welded construction to withstand the strains peculiar to a ship at sea. This principle having been established, it is not proposed altogether to dispense with riveting, which in certain sections is cheaper and quicker than welding; it is intended, however, that future vessels should be a combination of riveting and welding. The United States Shipping Board, for instance, having been in close touch with the experimental work, are making arrangements for the construction of a number of 10,000-ton standard ships in which the use of rivets will be reduced to 2½ per cent of the number originally required.

The recent progress achieved in electric welding by means of the flux-coated metal electrode process, and its successful use at Admiralty dockyards and elsewhere in the construction of fitments and superstructures of various vessels, led to permission being obtained for the erection of a standard barge with riveting eliminated and electric welding substituted throughout. Such a craft, it will be observed, is exposed to considerable rough usage in dock, besides being subjected to severe towing strains. In order to utilize material already available on site, this barge differs in no way from the standard riveted type with lapped joints, excepting that the hull plates were arranged for clinker build and plate edges joggled to permit horizontal downward welding in order to reduce the amount of overhead work, which is more difficult of execution.

The vessel to be welded was 125 feet between perpendiculars and 16 feet beam, with a displacement of 275 tons. The hull was rectangular in section amidships, with only the bilge plates curved. It was built up of 71 transverse frames and contained three bulkheads, those fitted fore and aft being watertight, and the one amidships non-watertight. The shell-plating was ¼-inch and ⅜-inch. All joints were lapped in the manner described.

Curiously, the first day's work was poor, though all the operators were first-rate men, with extensive experience of electric welding in the shops and minor repairs and structural work at shipyards. This was probably due to the novelty of the undertaking and to the position—lying flat on the keel—which they had to adopt to get to the joints. In a few days, when they became accustomed to the job, the speed and quality of the work improved to equal workshop standard practice. With the more difficult welding, such as the vertical butt joints on each shell-plating and overhead work underneath the keel and on bilge plates, it was noted that



INTERIOR VIEW OF ELECTRIC-WELDED VESSEL, SHOWING ATTACHMENT OF SIDE AND BILGE PLATES AND LONGITUDINAL STRINGERS TO TRANSVERSE FRAMES

the quality of the welds was excellent. For this overhead work special electrodes were employed and proved well worth the slightly increased cost. All watertight joints up to and including the underside of bilge plates were continuously welded both inside and outside, the other watertight joints being welded continuously on one side and tack welded on the other. On the shell-plating the continuous welding was on the outside in all cases.

For internal non-watertight joints and frame construction tack welding was adopted, the length of welding being carefully calculated to give a margin of strength over a similar riveted joint.

Taking all positions of work into consideration, the average speed was 4 feet an hour at the commencement, while towards the end of the work an average of 7 feet an hour was easily obtained.

Some interesting details are provided of the comparative cost of the electric welded and riveted barge. In labor 245 man-hours were saved in construction, which can easily be improved on in future work. More than 1000 pounds of metal was saved, owing to the absence of rivets, but greater

economy will result when the design is modified to suit electric-welded ship construction. The total cost of welding was £301, detailed as under:

Electrodes	£178
Electric current	61
Men's time	62
Total	£301

It is realized by the Admiralty experts that the proportion of costs for electrodes is high, but this is mainly due to the present limited demand. Demand and competition will have the usual effect and should reduce the cost of this item by at least 60 per cent. It will then be possible to build a vessel of this size with an estimated saving of from 25 to 40 per cent of time and about 10 per cent of material.

It is interesting to add that as a result of this demonstration the yards have prepared a new design of barge in which it is proposed to incorporate electric welding and riveted construction to the following extent:

To be Welded.—Coamings, shell seams to frames, deck butts to beams, bulkheads (including boundary bars), keel plate butts to be welded overlaps, after shell seams welded.

To be Riveted.—Floor riveted to frames, beam knees to frames and beams, frames clear of shell seams.—*Nautical Gazette*, 7/9.

LLOYD'S REGISTER AND ELECTRIC WELDING.—At a meeting of the General Committee of Lloyd's Register, which was held yesterday, the recommendations of the Technical Committee, following the experimental work of the Chief Ship Surveyor, that electric welding should under certain conditions replace riveting in ship ccnstruction were confirmed. With the general technical question involved, as well as the experimental work, we shall deal more fully in a subsequent issue, but a brief statement of the considerations on which the new regulations have been based will be of interest.

The rules have been devised on the results of experiments on electrically-welded joints, which included the determination of the ultimate strength of such joints and of the elastic properties, capacity to withstand alternating tensile and compressive stresses, such as are experienced by ships, and also chemical and microscopic analysis to determine whether a sound junction was effected between the original and added metal.

The results of the test may be considered on the whole to be very satisfactory, and to justify the step taken by Lloyd's Register in issuing the regulations now published.

The regulations are divided into two parts: The first dealing with the system of welding and workmanship, and the second with details of construction.

Under the first heading attention is drawn to the necessity for ensuring that the electrodes used are of uniform and reliable quality, and that only skilled workmen are employed under supervisors of proved ability. When it is remembered that most of the failures and disappointments which have occurred in the use of electric welding have been due to a neglect of these elementary precautions, the desirability of these requirements will be apparent. The specification of the details of construction provide that all butt and end connections must be lapped or strapped, the experience derived from the experiments having shown the greater suitability of these forms of joint. A complete fillet of welding is required to be fitted on each edge of the butts and landings of the shell, inner bottom and decks and the butts and edges of bulkhead plating. In the case of angle connections, such as of frames to shell, beams to deck and bulkhead stiffeners to plating a complete run of light welding is required at the heel of the bar with intermittent or tack welding at the toe.

The rules are necessarily of a tentative nature, and will, no doubt, be modified from time to time, in the light of the experience which will be available after a few welded ships have been in service. They have been issued at the present time primarily with a view to giving builders some guidance as to the lines on which they should proceed, but the committee will, as usual, be pleased to consider any alternative proposals that may be placed before them. Until such time as experience has been gained from the performance of vessels on actual sea service, the classification of electrically-welded vessels in Lloyd's Register Book will be subject to the notations "Experimental" and "Electrically Welded."—*The Engineer*, 16/8.

MISCELLANEOUS NOTES

THE MANUFACTURE OF CAST STEEL CHAINS.*—By Chester K. Brooks, Assistant to President National Malleable Castings Company.—Several months ago, when the National Malleable Castings Company was invited to participate in the experimental development of cast steel chain, the first problem which required attention was the working out of suitable foundry methods for producing chain links in sand moulds, and uniting them into continuous lengths of chain. A number of entirely successful equipments for making moulds was the result.

Connecting up the links into chain was accomplished in either of two ways, the continuous process, in which the entire chain is poured from one heat, into previously prepared and united moulds, by filling one interlinked mould impression after another, and the pre-cast link process, in which half the links comprising a complete length of chain are cast separately, shaken out, cleaned, inspected, and made ready for incorporation into the finished chain. Subsequently, the latter links are placed in mould cavities and coupled up into continuous chain by pouring metal into other moulds containing impressions for similar links, interlinked with the pre-cast links.

Another part of the foundry problem was the character of the mould. Recognizing the vital importance of sound castings in a product of this character, we came to the conclusion quite early in our experiment that all of the links should be produced in dry sand moulds. The methods of application of gates and risers have also required some study, and we have been able to obtain excellent results both in pouring through the stud and through the side of the link.

In our preparations for manufacture, the adaptation of the method of heat treatment used for our car-coupler knuckles to 90-feet shots of chain has involved some problems, but these have been solved and the process will be practically identical in method and results.

How Tests Were Conducted.—Referring the results of physical tests on cast steel stud chain, we felt that the testing facilities at our Sharon, Pa., steel castings plant, used principally in the manufacture of car couplers, were well suited for the carrying out of further tests which seemed desirable after the last experiments at Schenectady. Our suggestion having been accepted, we made plans to have ready as many different sizes of cast chain as possible in the short time available, and succeeded in preparing short lengths of 1⅜ inches, 2 inches, 2¼ inches and 2⅞ inches cast steel chain, ready for test on March 1 and 2, at our Sharon plant.

The tests were conducted on a vertical screw-type static testing machine of 1,000,000-pounds capacity and a standard master car builder's drop-testing machine. The chains subjected to static tension tests were supported by coupling each end link of the test chain to the cross-head of the static testing machine by means of a testing shackle and pin.

Test chains consisting of five common stud links were subjected to a light load sufficient to reduce high bearing spots between adjacent links, which was then released and a measurement over the three middle links laid off. The elongation over this measurement was then taken at load corresponding to the proof load, the breaking load, and the breaking load

* Paper read before the American Society for Testing Materials.

plus 40 per cent, as specified by the ship classification societies for the corresponding sizes of wrought chain. After these three loads had been applied, released, and elongation measured, a load of destruction was then applied.

TABLE I.—STATIC TENSION TESTS OF CHAIN

Test No.	Size	Weight of Test Chain	Elongation, in., after Proof Load	Elongation, in., after Breaking Load	Elongation, in., after Breaking Load Plus 40 Per Cent	Load at Rupture	Remarks
	in.	lb.				lb.	
1	1⅞	40	0.03	0.04	0.08	213,600	Broke No. 3 link. Section of metal solid.
2	1⅞	40	0.03	0.04	0.07	198,700	Broke No. 3 link. Section of metal few small blowholes.
3	1⅞	40	0.02	0.04	0.09	180,700	Broke No. 3 link. Section of metal honeycombed.
4	2	123	0.03	0.06	0.13	456,400	Broke No. 4 link. Small shrinkage in each fracture.
5	2	122	0.03	0.06	0.09	400,000	Broke No. 3 link. Section shows solid.
6	2	122	0.03	0.05	0.10	403,000	Broke No. 4 link. Section shows solid.
7	2	225	0.20	0.27	0.45	381,900	Broke top "E" link. Section shows few small blowholes.
8	2	223	0.10	0.22	0.63	346,500	Broke bottom "E" link. Section shows few small blowholes.
9	2	223	0.07	0.14	Not obtained	316,100	Broke bottom "E" link. Section shows few small blowholes.
10	2¼	174	0.05	0.09	0.20	494,400	Broke No. 1 link. Section shows solid.
11	2¼	174	0.07	0.13	0.33	495,400	Broke No. 3 link. Section shows solid.
12	2¼	175	0.06	0.11	0.22	513,200	Broke No. 5 link. Section shows solid.
13	2¼	172	0.02	0.05	0.14	502,400	Broke No. 3 link. Fractured through defect.
14	2¼	171	0.03	0.07	0.16	491,900	Broke No. 5 link. No. 3 link defective.
15	2	—	0.65	0.65	0.67	452,700	Broke No. 2 link. Section shows solid. See also dynamic test No. 4.
16	2⅛	251	0.00	0.00	0.00	764,700	Broke "E" link. Section shows few small blowholes in one side.
17	2	—	0.72	0.73	0.74	467,400	Broke No. 3 link. Section shows small shrinkage one side. See also dynamic test No. 7.

TABLE II.—DYNAMIC TENSION TESTS OF CHAIN

Test No.	Size	Material	Elongation, in., after Three Blows at 5 ft.	10 ft.	15 ft.	20 ft.	25 ft.	Total Blows at 25 ft.	Total Blows at 30 ft.	Total Blows at 35 ft.	Chain Broke on	Total Elongation	Remarks
	in.												
1	2	Wrought	0.02	0.05	0.15	—	—	—	—	—	1st at 20 ft.	0.15	*
2	2	Wrought	0.00	0.02	—	—	—	—	—	—	2nd at 15 ft.	0.02	†
3	2	Wrought	0.00	0.02	—	—	—	—	—	—	2nd at 15 ft.	0.02	‡
4	2	Naco	0.01	0.05	0.09	0.13	0.27	50	20	—	None	0.65	§
5	2	U. S. Navy	0.10	0.34	0.68	1.37	2.21	6	—	—	6th at 25 ft.	—	‖
6	2	U. S. Navy	0.06	0.32	0.74	1.32	2.08	10	2	—	None	3.85	¶
7	2	Naco	0.02	0.02	0.03	0.05	0.10	10	1	—	None	0.72	**
8	2	Naco	0.08	0.10	0.15	0.19	0.27	10	10	10	1st at 30 ft.	0.24	

* Broke Nos. 4 and 5 links. † Broke No. 1 link. ‡ Broke No. 1 link through weld. § Chain installed in static machine. See static test No. 15. ‖ Surface fractures in all links. Chain installed in static machine and broke No. 2 link at about 241,000 lb. ¶ Broke No. 4 link. Section shows solid. ** Chain installed in static machine. See static test No. 17.

Dynamic Tests Made.—The test chains used in the drop-testing machine were all of the 2-inch size and consisted of five stud links each. These chains were installed in the testing machine by connecting the upper link in a shackle bar and the lower link in an equalizer shackle by means of

shackle pins passing through the eye of each link. This arrangement is such that a part of the energy of the falling weight is transmitted to the test chain as a dynamic tensile stress. The overall measurement of the middle three links of these test chains was laid off as in the static tests and the elongation measured after the third blow from each of the specified heights. The weight of the tup was 1640 pounds, and this weight was allowed to rest upon the equalizer when readings were laid out and elongation measured. In all these tests the numbering of the links was upward, commencing with the bottom link as No. 1.

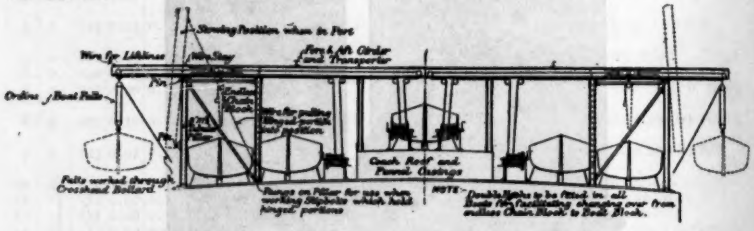
Table I shows the results of all the static tension tests and Table II the results of the dynamic tension tests. Included among the dynamic tests are not only the tests of 2-inch National Malleable Castings Company steel chain, but also certain tests on the same size specimens of commercial wrought-iron chain, and samples from the Boston navy yard.—*Engineering*, 9/8.

BULLET-PROOF VEST FOR AMERICAN SOLDIERS.

Here is the latest thing for the protection of American soldiers, the bullet-proof vest. It will stop any bullet either from revolver or shrapnel. It weighs four and a half pounds and is made of non-magnetic material and proved by official test to resist completely shrapnel at 1200 feet velocity per second, and, therefore, is proof against all shrapnel splinters and standard bullets fired at any range from any make revolver or pistol, including the German 300 bore 7.65 mm. Mauser automatic pistol using German bullets with solid conical heads. It is flexible and scientifically made to protect the sides and abdomen, as well as vital organs of the body.—*Washington Evening Star*, 6/9.

LIFEBOAT TRANSPORTING AND LOWERING GEAR.—The subject of stowing and lowering lifeboats on merchant ships is one of almost perennial interest, and at no time is it of greater importance than at present. The government requirements compel the carrying of lifeboats and rafts to accommodate the whole of the passengers and crew which may be carried

on any ship, and, as a rule, difficulty is experienced in stowing these in vessels in such a position as to enable them to be easily transferred to the davits or other lowering gear. Many solutions have been applied, notably by fitting turning-out gear on the ordinary types of davits, and having some arrangement for transporting the boats from inboard positions to davits by gear rigged on deck; by fitting davits of the quadrant type arranged in multiple numbers across the deck, and each capable of lifting boats in two positions in an athwartship direction; and by other mechanical means, such as cranes. These devices have been open to criticism. The first, where the transporting gear is placed on deck, involved difficulties due to such obstructions as skylights, ventilators, coach roofs, etc., these being in the center of the ship, so that the lifeboats could only be launched on the side of the ship on which they were stowed on deck. In the case of a ship with a heavy list to the opposite side, this increased the difficulty of launching the boats. With davits of the quadrant type the difficulty was to obtain deck space for the inboard set of davits.



END ELEVATION, ROSS-ANDERSON LIFEBOAT TRANSPORTING AND LOWERING GEAR

There is here illustrated the Ross-Anderson lifeboat transporter devised by Alexander Ross and John Anderson, members of the staff of Scotts' Shipbuilding & Engineering Company, Greenock, Scotland. In this case the transporting gear is entirely overhead, and as there is not only direct traverse from the extreme port to the extreme starboard side of the ship, but fore and aft traverse is also possible, any boat stowed within the compass of the overhead gear may be launched from any position either on the port or starboard side. The overhead gear consists of a series of athwartship and fore-and-aft girders carried on columns and forming overhead tracks for trolleys having a specially designed bearing to take an angular pull. The trolleys are operated by hand winches through endless wire ropes. At the outer end of each athwartship girder, ordinary boat falls are attached, as shown on the end elevation, so that while one boat is being lowered another can be traversed athwartship, ready for lowering as required. This also obviates the turning or swinging motions necessary with existing systems.

The girders for traversing boats in the fore and aft direction are supported on the top of those arranged for athwartship traverse. These fore-and-aft girders are arranged preferably above the longitudinal center line of one of the rows of boats on the deck. In passing the lifeboat fore and aft it is necessary to uncouple the trolley from the boat at the point of intersection of the traverse and longitudinal girders, but this is quickly done. It may be noted, further, that the extension of the transverse girders for launching the boats is pivoted approximately at or about its center, so that it can be folded back, as shown also on the end elevation when the vessel is in port. Thus there is no projection to obstruct the movement or working of the ship in harbor.

It will be seen that the system gives the maximum number of lowering stations, and has the further advantage that boats primarily intended for use on one station can be worked at any other station on each side of the vessel without undue inconvenience, while at the same time enabling boats in any inboard position to be easily transferred to any lowering station. The transports act as feeders while other boats are being lowered, greatly reducing the time occupied in launching a large number of boats. The gear is said to be lighter, and, being overhead, is less liable to be choked with dirt, which unavoidably accumulates on deck. It is worked entirely by hand, so that there is no complicated mechanism to get out of order, owing to prolonged disuse.—*Shipping*, 17/8.

TREATMENT OF WAR WOUNDS BY SULPHATE OF MAGNESIUM.—Doctors Morrison and Tulloch now obtain very good results in the treatment of wounds by the use of the following solution which is sterilized by heating in a digester of the usual type. Magnesium sulphate, 400 parts, dissolved in a mixture of 100 parts glycerine and 300 parts boiling water. In the treatment of a fresh wound, this is opened widely and a 5 per cent phenol solution is applied for 24 hours, after which the preceding solution is applied by means of compresses. The solution is renewed every 12 hours in the case of suppurated wounds. The pus disappears in two or three days, the scars become detached and the wound is now a bright red color. Growth of the epithelium is rapid, and the treatment can be continued until the wound is entirely healed. The solution should be employed in the above strength, for it is found that weaker solutions are not sufficiently active in the cure. As to the method of action which enters in here, this takes place by osmose, as in the case of Wright's solution. It will be remembered that the latter contains five parts citrate of soda and 50 parts salt per 1000 parts water. Sulphate of magnesia when thus employed, is said to be painless. As it is not absorbed by the system, it cannot exert a harmful action on the white corpuscles contained within the granulations. It has a specific destructive action upon various microbes such as the coli and pyocyanic bacillus.—*Scientific American*, 17/8.

GAS TO BLIND FOE SOON TO BE USED BY BOCHE ARMIES.—The Central Powers, it is reported, are soon to make extensive use on the Italian and French fronts of two new gases of lachrymatory type, from which they expect great results. The gases are said to cause permanent blindness.

The American troops have captured German rifles of the latest model. The weapon is the same length as the Springfield, but has a muzzle protector and flash arrester. There is a circular hole lined with steel in the stock, apparently for the purpose of bolting the stock to a mount for grenade firing.—*Evening Star*, 5/9.

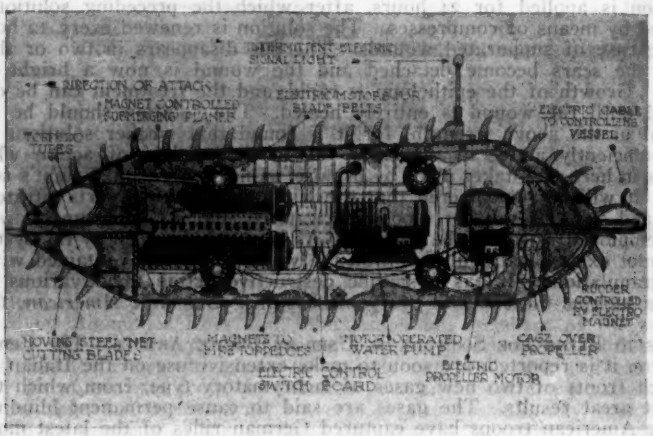
SEA TANKS AT POLA.—The application of the "tank" idea to marine warfare seems to have been successfully carried out by the Italians in their recent raid at Pola, where they destroyed by this means a large Austrian warship. Just what these "sea-tanks" are is not yet known in detail, but enough is understood and inferred to furnish material for a descriptive article of considerable length, contributed by H. Winfield Secor to *The Electrical Experimenter* (New York, September). The sea-tanks Mr. Secor tells us, measure about 40 feet by 6, and are propelled by electricity. They are provided with an endless rotary chain, running lengthwise around the vessel, and fitted with sharp steel barbs or knives which can cut their way through nets and other obstacles just like their prototypes, the land-tanks, first used so effectively by the British. He goes on:

"This underwater demon is provided with several torpedo-tubes at the bow, and from all accounts it seems that the device was crewless, and operated by means of electrical control currents sent through a flexible insulated cable connecting with a war vessel, which latter nosed its way up to within a few miles of the steel nets guarding the harbor of Pola.

"The account of the attack on Pola by the Italian sea-tanks states that they bored their way through the heavy steel nets spanning the navigable approaches to the port, within which there lay at anchor Austria's fighting fleet, and that a mighty Austrian battleship of the *Viribus Unitis* type of about 20,000 tons displacement was torpedoed.

"The detail illustration herewith shows the probable arrangement of the interior of the Italian underwater tank, also the arrangement whereby the steel belts carrying the net-cutting knives or barbs are driven by powerful electric motors, which obtain current from a storage battery carried in the undersea craft, or from electric energy supplied through the cable connected with it. . . . .

"It is entirely feasible for a device of this kind to be controlled by a warship of the destroyer class at a distance of seven miles or even eight to 10 miles or more. With ingenuity and the proper design of the device of the type here under discussion, and also in consideration of the undoubted and proved cleverness of the Italian engineers, there is no doubt but what such a device could be sent out and steered so as to be submerged when it neared the steel nets and to bore its way through them, and then



THROUGH A STEEL HARBOR NET

to rise again; also at this juncture the observation officer on the war vessel, looking through his night glasses, could press the proper electric button and cause one or more torpedoes to be discharged at an enemy war vessel in the manner described in the report from Rome, and which now forms a part of Italian naval history."

In any event, Mr. Secor concludes, the sea-tank would appear to be invulnerable against harbor nets and the like, and when designed to carry a crew and equipped with underwater search-lights, should prove effective in clearing out mine-fields, particularly such mine-infested waters as those leading up to the great German naval base at Heligoland. He goes on:

"This maneuver by the Italian sea-tanks in their attack on Pola may seem all the more practical and possible to the layman when it is considered that the entire Gulf of Venice is very shallow—about 120 feet at greatest depth—and such an underwater fighting monster might crawl even along the bed of the Gulf of Venice and tackle the steel nets and mines protecting Pola, much in the same manner as a gigantic turtle would crawl along the bed of a lake. In fact, some engineers venture the opinion that with the proper design of the moving caterpillar and barbs the tank could be made self-propelling in the same manner as just mentioned.

"It is most probable, however, that the Italian sea-tank as now used is fitted with powerful propellers the same as the submarine, and also that it has a suitable rudder for the purpose of steering it. To prevent the cable from becoming fouled in the propeller blades, the latter are encased in substantial steel cages. The pilot light or lights are provided with shields at the front, so as to throw intermittent signal flashes sternward, and by arranging this on a telescopic mast the officer in charge can, by simply pressing the proper button, cause them to rise 10 to 15 feet above the back of the sea-tank while it is progressing through the water near its objective. When the tank has progressed sufficiently near the net or other obstruction it is to burrow through, the proper electrical impulses are sent over the electrical control cable, which starts up the water-ballast tank motor, and by filling the tanks the craft is caused to submerge. It is a simple matter and one which has been used heretofore to provide a suitable electrical position-indicating arrangement, whereby it becomes possible to know at any instant the direction and location of the sea-tank while it is submerged. By means of a sensitive microphone installed in the vessel, it would be possible to ascertain when the tank had chewed its way through the enemy nets, and it could then be caused to approach the surface again if so desired. It is not, however, imperative that the vessel be made to come to the surface so as to show the signal light, for by means of the position-indicating apparatus, just described, its exact position at any moment could be known and torpedoes discharged from it at any enemy war vessel swinging at anchor within the netted area."—*Literary Digest*, 14/9.

CURRENT NAVAL AND PROFESSIONAL PAPERS

UNITED STATES

ATLANTIC MONTHLY. **September.**—As a Signalman Saw It (*Emden-Sidney* action), by *Lewis R. Freeman.* Off the Dogger Bank (Letter by British Officer). Students of the Sea (Great Lakes Training Station), by *Joseph Husband.*

BOOKMAN. **September.**—Sea Power Past and Present, by *Allan Westcott.*

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WORLD'S WORK. **September.**—Herzog, the Trade Bernhardi (II), by *Ralph W. Page.* Sweeping the North Sea, by *Lieut. Lewis R. Freeman.*

SCIENTIFIC AMERICAN. **July 27.**—The Heavy Oil Engine. **September 14.**—Problems of the Pacific, by *Prof. R. F. Irvine.* "Laying Down" a Ship. Modern Aeronautics, by *Dr. W. F. Durand.* Wake-Stream and Suction, by *C. H. Holst.*

JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERING. **August 18.**—Air Propulsion.

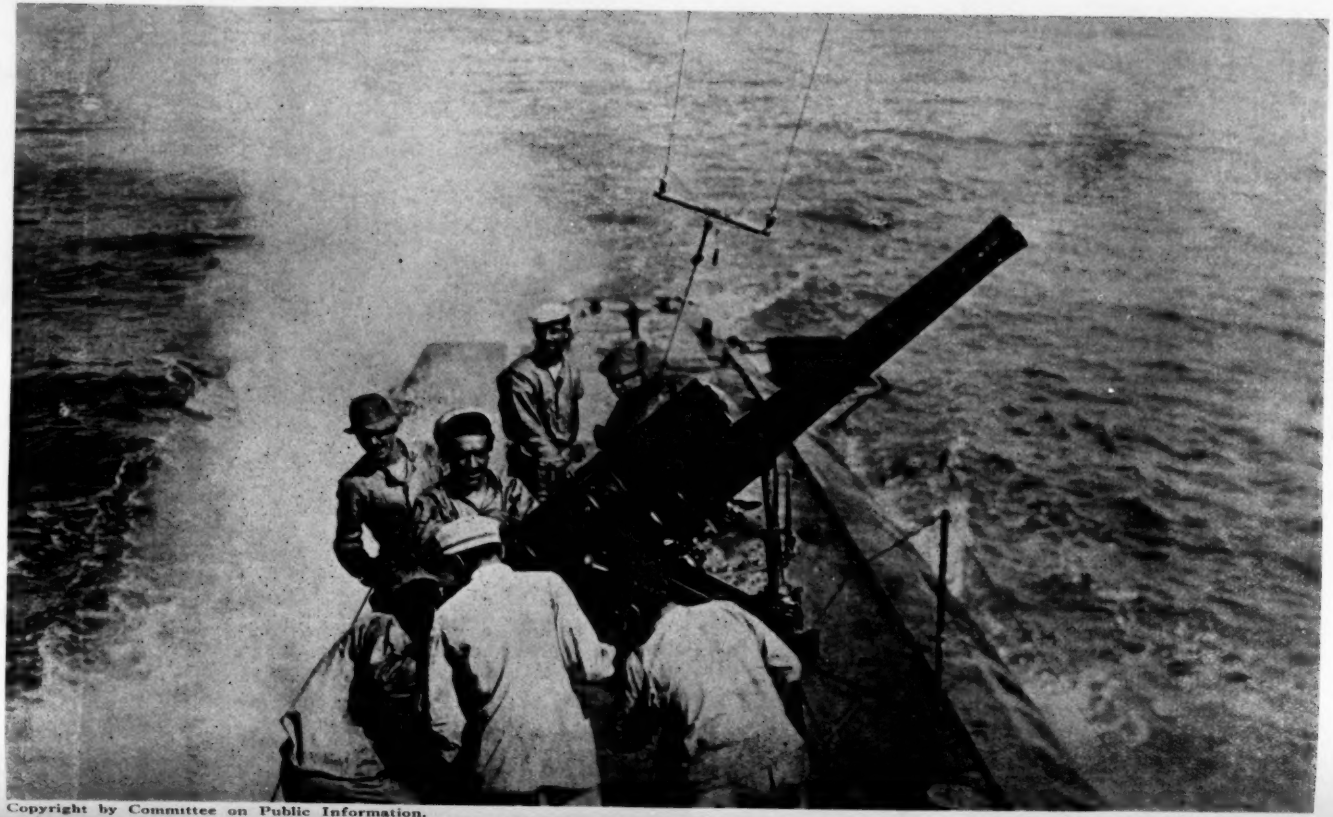
GREAT BRITAIN

CONTEMPORARY REVIEW. **August.**—A Monroe Doctrine for Australasia, by *A. D. McLaren.*

THE ENGINEER. **June 28, July 5, July 12.**—Moving Targets and Torpedo Attack.

CONTINENTAL EUROPE

RIVISTA MARITTIMA (Rome). **July.**—The "Bottling Up" of Zeebrugge and Ostend.



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ANTI-AIRCRAFT GUN ON ITALIAN DESTROYER.

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NAVAL WAR NOTES

PREPARED BY

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STRATEGY

Can Submarines Combine?—By Arthur Pollen.—Recent naval news was on balance exceptionally interesting and satisfactory. There were certain casualties, an armed liner sunk, a destroyer ashore, the *Justicia*, one of the largest steamers afloat, torpedoed. But, except the last, they were casualties of a not unusual kind. All the other news was excellent. The seaplane raid on Tondern means, of course, much more than that a certain number of bombs have been dropped on Zeppelin sheds. A very considerable naval expedition has once more gone right into German waters, and the enemy has not dared to interfere with it by any of his naval forces. The return of ships lost by submarine in the month of June is the lowest for a very long time. The rate of loss is in point of fact only two-thirds of what it was in the quarter before the ruthless campaign began, and only one-third of what the loss was at its worst a year ago. The first is a striking comparison for, as we know, ruthlessness doubles the rate of success. The figures, therefore, are a testimony to the progress of the counter-campaign as eloquent as they can well be. If we could leave them to speak for themselves, their message would seem to be that the situation is as satisfactory as it can possibly be and as likely to improve. But this, for reasons which I will explain, is a matter as to which we should be on our guard.

It is small wonder, then, that we were all inclined to be in very optimistic mood, and by what seemed a felicitous chance, there was added for our

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gratification the announcement that the destroyer *Marne* had sunk a submarine, just as our Allies were marching victoriously across the river of the same name! But two days later our complacency was somewhat disturbed. The 32,000-ton liner, *Justicia*, a priceless unit in the vital business of bringing the American Army to Europe, convoyed and escorted as her value demanded was, we were told, submarined on July 19, in circumstances of a very peculiar kind. She had maintained a battle, we heard, for twenty-four hours against a veritable fleet of submarines. Some accounts said eight or ten. One witness, after a week's reflection, decided that it was only seven. The ship was hit early in the affray, but was got under tow and was making for a north of Ireland port, when, after defeating attack after attack, a final salvo did the business.

The loss of life was not very great. The loss of the ship, we also heard, had occasioned more joy in Germany than would the saving of ninety-nine ships here. The Germans, I imagine, supposed that she was their liner *Vaterland*, now traitorously bringing ten battalions at a trip to fight the nation that produced her. She had, the telegrams told us, been marked down by the U-boats for a long time, but had thwarted their efforts by her net defences. To most people it was news that the net had been revived.

But this was not the only novelty of the story. It was new that the submarines were hunting, not singly, nor even in couples, but in fleets. New it was too, that the *Justicia's* gunners picked off the torpedoes as they came towards the ship, and either blew them up or deflected them from their course. As the public read these tales, regret for the loss of so fine a ship was superseded by the comfort derived from a proof that the sinking of a ship had been made so difficult a matter. If nets have thwarted torpedoes so often, if the weapons themselves could be neutralized by marksmanship, were we not, it was asked, getting to a point when the submarine would soon be no threat at all?

A day after these sensational stories had flooded our papers, the Admiralty issued a somewhat soberer version of the incident. From this it was clear that *Justicia* had been attacked by more than one submarine—for it was one of those maneuvering into position to torpedo this vessel that *Marne* had destroyed. But there was nothing in the *communique* to justify the supposition that several submarines had engaged in a *combined* attack. Had they done so, had the Germans shown a capacity to employ several submarines in support of each other, a new phase of submarine war would have been indicated. It has hitherto always been assumed that one of the chief weaknesses of the submarine is that it is incapable of squadronal combination. There is nothing in the official story to show that this theory is mistaken. And until it is proved so, I should prefer to think that the *Justicia*, first torpedoed in an area where a single submarine was operating, had been compelled to go at very low speed in the direction of some Irish port, and on the way there had traversed other areas, each similarly the sphere of a single submarine's activities. We are told that the *Justicia*, with other ships, was being escorted by torpedo boat destroyers and other craft. She was, probably, then one of a convoy and, when her speed was reduced by injury and, when afterwards in tow, a ship of these vast dimensions, surrounded by destroyers, sloops, etc., would be a mark easily picked up even at the most considerable range. That she should be attacked first by one and then by a second, and then again by a third and a fourth submarine would not be surprising, if she were to traverse at right angles a series of routes, on each of which a submarine was watching for its prey. So much for the theory of a continuous battle with a group of submarines. Next, I find it rather difficult to believe that torpedoes were exploded by gunfire, though it is far from impossible that they may have been deflected. Still, even this might have been a most exceptional occurrence, little likely to be repeated. No previous instance of such a thing happening has been reported, and the chances

of such a thing occurring must be infinitesimal. We ought to have been told that this incident was unusual.

It is little difficult to understand how the first stories got into print. The censorship exists, one is told, primarily to prevent information of value reaching the enemy. Its secondary purpose is to stop the dissemination of news and views that might imperil morale at hime. It does not seem to be contemplated that it should protect the public from misleading narratives. Yet it is a pity it should not. The public is very easily fooled, and there must be some elements of danger when altogether wrong impressions become prevalent. If a policy of complete secrecy could be preserved, it would, no doubt, be the best policy of all. But that is impossible, and we have in its place, not a consistent and reasoned effort to make the public understand the character, course, and proportion of this or that phase of the war, but a constant flow of partial information, with now and then a sensational confidence, and all the time an almost unrestricted liberty in the circulation of such cock and bull stories as the *Justicia's* battle with the ten submarines. These things leave the average reader in a state of utter confusion.

Let me give an example of the result. Some time last November, I think it was, the Premier, in a well-meant endeavor to make the nation realize the submarine menace was well in hand, clinched his argument by announcing that on the day before his speech, five submarines had been caught and destroyed by His Majesty's forces. Soon after, or it may have been about the same time, it was officially stated that we were actually sinking submarines as fast, if not faster, than the enemy could build them. These two things together gave many people the impression that the Germans must be building fifty or sixty submarines a month, and that we were destroying them at the rate of 90 or 100. A little reflection on the known facts of the case would show that the Germans began the war with twenty-eight submarines, were perhaps able to build as many more before January, 1916, and something less than three a week in the succeeding years. Thus we should have:

In hand August, 1914	28
Constructed before January 1, 1916	28
Constructed before January 1, 1917	140
Constructed before January 1, 1918	140
Constructed before July, 1918	70
Total	406

Four hundred submarines is, then, the outside figure that Germany ever can have built or possessed. If our destruction caught up their production in October, 1917, *i. e.*, nine months ago, and if the first process has been progressive and the second stationary, we may perhaps assume that we have now brought back the enemy's stock of submarines to what they were eighteen months ago. His present total, then, would be, at most, about 200, less such losses as were incurred in the first two and a half years of the war. These would hardly have been less than 50 or 60, so that it is quite probable that the enemy has not to-day more than 150 in all. Some of these must be kept for training officers and crews, some will be fitting out for their first commissions, others will be in dockyard hands, or simply lying in port while the crews rest. The total number actually at sea at any one moment can never be very large.

I cannot pretend that these figures are accurate, but I am sure that they are not wildly wrong, and I have given them because I want to ask this question. Is there any good reason why the public should be mystified in this matter any longer? It is quite certain that at this stage very little that is useful can be done in the way of mystifying the enemy. I submit that the public would be in a far better position to form a well-balanced view of the campaign if approximately complete figures of submarines

built and sunk and of the numbers usually operating were given. For that matter, I should like again to put in a plea for our being supplied with absolutely full information about the campaigns, once it is six months old. We know the tonnage lost, we used to be told the numbers of ships. Why not give us full charts of all the attacks and sinkings month by month. They would be most instructive and interesting. There are two reasons for pressing for all the publicity that is permissible at this moment. We are for the first time realizing the incredible scale and value of the American effort. It is fresh in our minds that no sooner was the attack of March 21 delivered than America leapt to the rescue, and took to sending us a quarter of a million men a month instead of 40,000. One startling fact galvanized the whole nation into life. Now, when America came in, I pointed out in these columns that our real ally was not the American Government, but the American people. It is the American people we should educate, and news—and not eloquence—is their best educator. In April, 1917, I wrote that in taking the American people into our confidence we should no doubt give the enemy a great deal of information that he would find exceedingly useful, but if the American people acted on that information the publicity would be far more useful to us. This still remains true, and it seems to me there is a special reason for frankness at this moment. The German Army has just received a blow from which it is still reeling. The German morale will react on this, and react very shortly. The enemy's higher command has probably anticipated this, and has already prepared for some kind of counter-stroke. That counter-stroke may very probably be a stroke at sea—a fresh effort, that is to say, to obtain submarine results of a striking character may certainly be made. We should not be surprised, then, if the sinkings for the latter half of July, for August and September showed a marked increase. Observe that the unwelcome presence of American soldiers in France has already brought submarines to operate off the American coast. The loss of a United States cruiser by mine near New York Harbor is only one evidence of this new activity. If a new and large effort is made there is everything to be said in favor of the public of both hemispheres being prepared for it and being put in a position to understand it. The stories about the *Justicia* are final proof that the old methods are worn out. Let us have the truth; and, if not all the truth, at least nearly all.—*Land and Water*, 1/8.

THE SILENT POWER IN THIS WAR.—Vice-Admiral Sims is authority for the conclusion that the world is to-day witnessing the most impressive manifestation of sea power that history has ever recorded. The enemy is without representation on any of the trade routes. The waters of the earth are free to allied commerce. The submarine menace is decreasing just as the activities of that form of warfare have been checked by an energetic and enterprising English and American anti-submarine campaign. The record of the movements of commerce and especially of the overseas transportation of troops and their supplies, has been magnificent in its escape from interruption and destruction. It is a surprise even to those who appreciated that the admirable convoy system maintained by the American naval force was destined to be effective. With practically no loss, millions of soldiers have crossed the English Channel and thousands on thousands of men have traversed the ocean of the allied coast and from the United States. This was made possible only because of the hundreds of allied destroyers, mine sweepers, sloops, submarines, and even small motor launches employed on convoying troopships and supply ships and in harassing and sinking enemy submarines.

In the meantime, the German fleet remains in hiding with little chance of emerging into the open to engage a foe that is overpowering in strength and so well distributed throughout the seven seas that the escape of a few from the North Sea would only mean a short period of piratical activity and then destruction. If, on the other hand, the enemy cruisers

were free to take the sea they could quickly destroy or drive into port the allied escort and patrolling craft and, of course, leave the allied merchant shipping defenseless. But as Vice-Admiral Sims has remarked:

"It is the silent and irresistible power of the allied battle fleets that prevents this, that imposes upon the enemy fleet the humiliation of impotence. None of his surface vessels can do more than attempt a sudden raid and scurry back to port before being intercepted by superior forces. Only the submarine can hope to escape unobserved and prey upon commerce."

No officer is in a better position to express an opinion that is worth accepting as sound in judgment and rich in information than is Vice-Admiral Sims, the character of whose present duty is such as to furnish him with exceptional advantages of knowing exactly the situation abroad and the nature of whose vast experience and performance in the naval service fits him to form views that are entitled to public acceptance and service respect. Therefore, it is with considerable gratification that we learn from that source that there will be no difficulty in suppressing the submarine, regardless of their numbers, when we shall have sufficient vessels now being put into action. This, he says, is perfectly understood by the enemy, who must know as well as we do that the German submarine campaign cannot succeed. Vice-Admiral Sims adds: "They also know that in the immediate future the monthly additions to the allied tonnage will be very great, that there will be no reasonable limit to the number of troops America can send to Europe, and that, therefore, they cannot win the war if they allow time for these essential forces to be put in operation. It is doubtless for this reason that they have taken the desperate chance of the present drive on the western front in the hope of achieving sufficient success to force a compromise peace. They know as well as we do that if this drive does not succeed—that is, if it is stopped—they must eventually lose."

It will be seen, therefore, that sea power has come to play the most vital part in the issue with the Germans, and too much publicity cannot be imparted to this factor in the great contest, since there are people in this country who have failed to appreciate at its true value the service rendered by what Vice-Admiral Sims graphically terms "the silent and irresistible power of the allied battle fleets."

Too much glory cannot be attached to the splendid patient vigilance of the British naval force that has prevented the entrance of the German fleet upon a career of damaging activity. This has been an aspect of the war that has not been so conspicuous as the operations of the forces on land, although it has not been without its casualties and its impressive sacrifices and inspiring examples of personal courage; but it has been potent in hampering the enemy, has been indispensable as an adjunct of the movements from many quarters of troops and their supplies to the theater of operations in France. Without the sea power that has been successfully maintained it would have been impossible, of course, to have prolonged the war to its present date with prevailing chances of defeat to the enemy. The lesson to be extracted from the situation is that we should proceed with all possible expedition in the labor of building ships of the various types necessary in increasing this advantage we have over the enemy. It is of the greatest importance, again quoting Vice-Admiral Sims, that we do not relax for a moment "our utmost effort against the resourceful enemy; now is the time to hit our hardest"—in the way of indefatigable preparation.—*Army and Navy Register*, 7/9.

COMPOSITION OF THE ANTI-U-BOAT FLEET.—Some interesting figures have lately been published showing the relative percentages of the Allied fleets that are engaged in anti-U-boat warfare. It seems that in the Eastern Atlantic 80 per cent of the vessels are British, 14 per cent American and six per cent French. The submarines engaged in the same waters

are 78 per cent British, 17 per cent French and 5 per cent American. Of the miscellaneous patrol craft, made up of yachts, motor boats, etc., 86 per cent are British, 11 per cent French and three per cent American. In the Mediterranean 38 per cent of the destroyers are French, 27 per cent British, 26 per cent Italian, seven per cent Japanese and two per cent American. Of the submarines, 50 per cent are Italian, 30 per cent French and 13 per cent British. Of the miscellaneous vessels 65 per cent are French, 23 per cent British, eight per cent American and four per cent Italian. Of the vessels engaged in convoying vessels across the Atlantic, 70 per cent are British, 27 per cent American and three per cent French.—*Scientific American*, 14/9.

THE WAR AT SEA.—By a Naval Officer.—Four years ago in this third week of August the Admiralty, in an official *communiqué*, referred to the "desultory fighting" which had taken place between the British patrolling squadrons and flotillas and the German reconnoitering cruisers. It was in the same announcement we were told that "a certain liveliness is apparent in the southern end of the North Sea." German naval strategy so far as it had developed was marked by a species of guerilla warfare in home waters, and commerce raiding in the outer ocean. A week later we swept into the Heligoland Bight, and by a skilfully-handled operation inflicted considerable loss upon the German destroyers and light cruisers. The events of those two weeks were significant of the situation brought about by the foresight and sagacity of the British naval authorities before the war, and their promptitude and decision when it occurred. There can be no question that the Germans hoped for and intended a very different setting of the naval stage during the first weeks of the war. The movement of the Grand Fleet to Scapa Flow was decisive. It made the Germans assume a defensive attitude, their tactics therefrom were those of a nation which had accepted inferiority at sea. On the other hand, the affair in the Bight with other events showed as plainly that an offensive policy was the established rule at the War Staff of the British Admiralty. The destruction of von Spee's squadron off the Falklands on December 8, the second decisive event in the sea war, was clear evidence of the line of action which the naval advisers of the government were prepared to take. The state of affairs in the shipyards afforded a further promise of later developments in the same direction.

By the end of the year the Sea Power of this country and its Allies had been firmly established. But the influence of political affairs in connection with the navy had already been revealed, in the first place by what happened in the Mediterranean, and in the second by the losses which the Fleet sustained from the assault of the enemy submarines. The mistake made in not following the *Goeben* with a superior force into the Sea of Marmora was irreparable, but the submarine warfare, which had been foreseen, and might have been provided against had naval advice been followed, was fortunately met before it became serious by the measures devised and initiated in the early part of 1915. Moreover, when coast-raiding tactics were substituted by the enemy for the plans of commerce destruction which had failed, these also were promptly met and countered at the battle of the Dogger Bank. From that time onward, however, until towards the close of 1916, there was little or no further sign that naval policy was directed by a War Staff such as had been established before the war began, but the influence of which began to wane even before the first submarine "blockade" was threatened.

It is because the situation to-day at sea resembles in several of its features that which obtained four years ago that it is worth while recalling the circumstances which have brought this about. The improvement dates from the day when Sir Edward Carson succeeeded Mr. Balfour at the Admiralty and Lord Jellicoe relinquished the command of the Grand Fleet to become First Sea Lord. The mischief already done was to bear evil

fruit in the spring of 1917, but reform was taken in hand in time. The menace of the submarine was already manifest when Lord Jellicoe brought an influx of young blood from the sea and laid the foundation for the direction of policy, which although it involved no revolutionary change has influenced the progressive advance in administration, as evidenced by satisfactory results. Manifestly the measures which have been taken to deal with the submarine menace took time to perfect, and the obligatory delay was, as is now a matter of common knowledge, a source of extreme danger. A year ago, said Sir Eric Geddes on July 30 of this year, we were faced with the situation which up to that time was considered by many almost inconceivable and insoluble. "Our available mercantile marine power was being sunk at a rate which would soon have brought us to the point of inability to continue the war, and we were without tried and recognized means of combating it." It has been met, and Sir Eric, on November 1, 1917, explained the changes in the constitution and organization of the Board of Admiralty which made it possible. "This organization," he said, "is working smoothly and well"; and he added, "in this matter I have, I am glad to think, merely followed and developed a policy initiated by my distinguished predecessor."

The changes made in 1917 were not all concerned with the system at the Admiralty, for in April, or a month before Sir Eric Geddes became Controller, the principle of convoy had been adopted, and, owing to the efficacy of this and other defensive means devised at the time, the First Lord was able to say in November that during the past seven months there had been a steady and very great reduction in the damage done by the enemy underwater craft. There is no doubt that convoy would have been introduced even earlier had a sufficiency of vessels for protective duties been available. It was the necessity of supplying these vessels which obliged the utilization of our shipbuilding resources for anti-submarine craft to the detriment of the mercantile marine output for a time. In March last Sir Eric Geddes described the three factors which make up the indivisible problem of meeting the "U" boat menace. These are: (1) Patrol and other craft to destroy submarines and safeguard ships at sea. (2) Salvage and repair of damaged ships. (3) Building of new merchant ships. The first is obviously an offensive factor, and it was necessary for the success of the measures taken that effort should be mainly concentrated on it at the outset. The coming of America into the war was most fortunate, for the assistance given, especially in the provision of small craft, helped materially to solve this problem. The replacement of British tonnage destroyed must indeed make a much greater advance than is the case at present before the situation in this respect can be held to be satisfactory. The point is, however, that the foundation of progress and improvement was well and truly laid at the end of 1916, and has since then developed energetically, and with hardly a single mistake. Thus a situation has been brought about which may be regarded with satisfaction and confidence. That there are dangers to be encountered in the future from an enemy so wily and unscrupulous goes without saying, but with the return to the old and tried policy of a vigorous offensive, there is no reason why we may not hope for continued success.—*Army and Navy Gazette*, 24/8.

LESSONS OF THE WAR

THE U-BOAT AND THE Q-BOAT.—By a Naval Officer.—Few people can be unaware now that the submarine warfare, which has been such a marked feature of the struggle at sea, came, more or less—and principally more—as a surprise to all the nations, whether they were or were not engaged in the conflict. In the British Navy, among the senior officers who believed in the possibilities of the submarine and had vision of its range of action, Lord Fisher and Sir Percy Scott almost stood alone. But among the more junior officers there were many whose belief in the submarine was un-

bounded, and who hoped that if it came to war they would have an opportunity of showing what they could do with it. Many of them have been given the chance, and the records of naval warfare during the last four years show how valiantly, and with what splendid skill and glorious courage, they have realized their dreams. It is very doubtful indeed whether in the German Navy there were any counterparts to these officers in the British Service. Von Tirpitz showed no signs before the war of a belief in the submarine, and we have it on the authority of Weddigen that his early successes astonished him and did not immediately receive credence from his comrades. It was not, indeed, until January, 1915, or nearly six months after the war began, that von Tirpitz conceived the plan of a submarine blockade of these islands.

It is doubtful whether the German Emperor, when he agreed to the submarine warfare on merchantmen advocated by the Grand Admiral, completely realized the manner in which it was to be conducted. By all accounts he was deceived about the number of submarines which could be employed in the campaign. Von Tirpitz is said to have asserted that he had 200 boats ready when he really had less than half that number. As soon, however, as it was understood in this country what was about to happen, plans and preparations were made to meet the coming onslaught. Nearly everything had to be improvised, but the measures taken were sufficient to an extent which enabled the authorities by the end of the year to say that the menace had been met if it had not been mastered. Among the anti-submarine measures initiated and encouraged by Mr. Churchill and Lord Fisher were the "Q" boats, the mystery attaching to which has now been dispelled by Sir Eric Geddes.

It may be taken for granted that the veil of mystery with which the adventures and exploits of the "Q" boats has been enveloped for over three years would not now be lifted were it not certain, in the first place, that the Germans by dire experience had become acquainted with the facts, and, secondly, that other measures offering promise of equally deadly success were ready for use. Indeed, the First Lord intimated on Sunday night that he and Admiral Sims had more ways than one of trapping submarines. The "Q" boat may be briefly defined as a decoy. The stratagem or artifice is as old as sea warfare. As soon as it became manifest that the unscrupulous submarine commanders stickled at nothing in their purpose, and were prepared in defiance of international law and the dictates of humanity to use all the advantages which underwater warfare provided for them, it was clear that cunning must be met with cunning and craft with craft. Since they were ready to sink at sight, regardless of the sacrifice of life, and to allow their victims to perish in open boats or to shell them out of existence so that no trace might remain of these ill deeds, it behoved the British seamen to leave no steps untaken to frustrate their knavish tricks and foil their evil plans.

The skill and resourcefulness of the British seamen brought to bear upon the problem speedily evolved the idea of the decoy as a fitting answer to the foul play of which Fritz was guilty, and thus the "Q" boat came into being. It was merely necessary at first to place one or more guns of a sufficient caliber to make penetration of the "U" boat's skin a certainty on any description of merchant ship, and to conceal their presence and that of a skilled crew of marksmen. The submarine, bent on the destruction of its quarry, came within range of the disguised vessel's guns, and was promptly put down. But such simple tactics were not effective for long, and more subtlety and invention were needed both to hide the real character of the "Q" boat and to enveigle the submarine within decisive range of her guns. Thus in the case of the *Baralong*, which sank the murderers of the *Arabic's* crew and passengers, the Germans complained that there was nothing in the outward appearance of this vessel to indicate her warlike character, and that fire was suddenly opened from an armament which up to that time had been hidden by screens and were only visible

when the latter were removed. To throw them off their guard by such a device they termed treachery, and howled when they discovered the snare which the British seamen had devised for them. Truly, as Mr. Balfour said at the time, any surprise or *ruse de guerre* employed by Germans is considered by them to be legitimate, but everything of the kind becomes illegitimate when practiced against Germans.

Although the Germans squealed, they were not above taking a leaf out of the British book. The commerce destroyers which they launched or attempted to launch upon the Atlantic were fitted with guns behind false bulkheads and mechanically-operated bulwarks which dropped down or slid aside when the time came for action. Both the *Moewe* and the *Greif* were equipped in this way. Some of the "U" boats, too, have been known to attempt disguise by means of sails with intent to lure innocent merchantmen to their destruction. Many yarns have been spun about the achievements of the "Q" boat commanders and, as must be generally known, several V. C's and other decorations have been awarded for gallant deeds performed in this branch of the Service. Some of the stories told of their doings may be apocryphal, but the Admiralty can soon remedy this by putting out authentic reports, and these dramatic and exciting episodes of sea warfare will lend themselves better than more prosaic work of the Fleet to the deft handling of practiced *littérateurs* like Mr. Kipling and Sir Henry Newbolt. The novel and stirring incidents of "Q" boat warfare which the Admiralty records contain will assuredly be as full of thrills as the Tales of The Trade. The account which Sir Eric Geddes gave in his address at the Palace Theater of the fight between "Q" 50 and a submarine revealed a high standard of courage and discipline, such as would be expected from a British crew. But it also displayed a knowledge of stagecraft, from the introduction of the villain of the piece through act after act up to the culminating *denouement*, when the "U" boat was sent to her last home. It may be hoped that before long their countrymen may learn the names of those who have so admirably sustained the traditional spirit and resourcefulness of the British Navy.—*Army and Navy Gazette*, 10/8.

THE BLOCKADE.—Asked for information as to what arrangements are in force for co-ordinating the blockade policy of the Allies, Commander F. Leverton Harris, Parliamentary Secretary to Ministry of Blockade, says: "We are working in complete accord with our Allies in a joint policy of blockade, which is settled by constant exchange of views and comparison of information between the governments concerned. An Allied Blockade Advisory Committee, which is presided over by the Parliamentary Under-Secretary of Blockade, sits regularly in London, and Allied sub-committees, which have proved to be of great value, have been set up in Norway, Sweden, Denmark, and Holland to advise this committee regarding blockade matters in those countries. Representatives of the Allied countries are also giving valuable assistance on other committees dealing with specific blockade questions.—*Army and Navy Gazette*, 24/8.

WITH THE AMERICAN FLEET.—By Herman Whitaker.—A certain picture at the Royal Academy this year shows English fishermen on gaze at a long line of American destroyers emerging from a background of mist and rain. I am sure that no American can view that picture without experiencing a swelling in his throat. I should imagine that it might excite equal emotion in an Englishman. For that starry banner, streaming out in the mist, waves over a closed breach; signifies the healing of an old sore; stands for the concord of the Anglo-Saxon peoples, at last full and complete.

This brief account of the American fleet's work during the yast year may well begin with a review of the situation which the first units depicted in that picture found on their arrival in British waters last year. For the last two days of the voyage they cruised amidst the wreckage of tor-

pedoed ships—boxes, barrels, crates; smashed boats, often with dead and dying men in them; drowned animals; alas! far too often, dead men and women, still upheld by life-preservers.

Far better, however, than by any pen picture, the situation is set forth in the accompanying map, which approximately gives the sinkings of Allied ships during April, 1917. Each of the black dots and circles that surround the Allied coasts with a mourning border represents a ship sunk by torpedo, mine, or gun-fire. But now, one year later, the month of April shows a happy reduction in sinkings of 70 per cent.

This striking change appears still more remarkable when we remember the tremendous volume of transport tonnage which was added to the normal merchant trade during the year. Troop and supply ships aggregating two and a quarter millions of tons streamed in a gigantic ferry across the Atlantic, carrying a million American soldiers to France. These ships had to be and were securely convoyed—so securely that even Hindenburg acknowledged the other day that it was suicide for a U-boat to attack them—and this extra service drew from the English and American fleets a large number of destroyers which would otherwise have been used to protect merchant shipping and hunt down U-boats. It goes without saying, therefore, that but for this paramount necessity, the number of merchant sinkings would have been still less; the number of U-boats sunk, still more.

As it is, we may rest satisfied; for the most gratifying feature is found in the fact that during the last three months the two great curves that represent U-boats sunk and new ships built, show a remarkable acceleration. In the first year of the war the U-boat curve was little better than horizontal. It really began to curve late in the following year, and has gone on bending upwards more and more steeply, until, in the fast few months, it threatens to become vertical. We are now sinking U-boats faster than the Germans can build them. We are building ships faster than the U-boats can sink them. In the sense of a contest in which the issue is still at stake, the underseas war is over. Henceforth it descends to the level of privateering and sporadic raids, which will become fewer as the months go by.

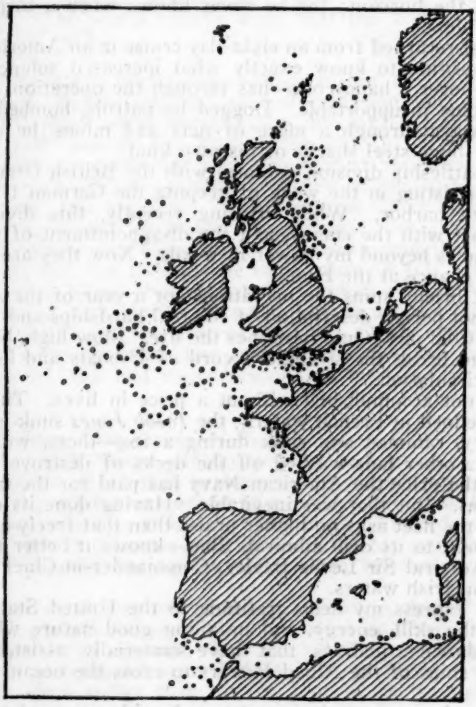
This remarkable showing is, of course, the product of many factors—the introduction and extension of the convoy system; improved methods of hunting U-boats by depth-mine barrages; the perfection of listening devices; the use of Allied submarines to hunt down U-boats; the extension of the Naval Aviation Service, both American and English; the closing of Zeebrugge and Ostend; and blocking of other U-boat routes by new minefields; in all of which the American fleet has assisted.

Before touching on its work, a word on its composition. Battleships, dreadnoughts, destroyers, scouts, cruisers, submarines, armed yachts, coast-guard vessels, mine-layers, and repair ships, make up the main body, which is manned by a personnel of more than 40,000 men. To this now has to be added over a hundred "chasers" and their crews; many thousands of men serving on troop and supply ships, naval transports, as armed guards, radio and signal men; naval gun crews furnished to merchant vessels; lastly, 10,000 men of the American Naval Aviation Service. Lumping them all together, 100,000 men would be a conservative estimate of the American naval forces, either serving directly under the command of Admiral Sims, or coming and going in the transport service.

Judged by any standard, this is a large fleet, and one of the most satisfactory things about it—to an American, at least—is found in the fact that its upkeep has laid no additional burden on England—already overweighted with her own war costs and those of weaker allies. The American fleet is practically self-sustaining. All its food and supplies have been brought from the United States. Excepting major operations that require a dry dock, it makes its own repairs. It manufactures its own torpedoes; provides its own hospitals; and as sailors, like other men, cannot live by bread alone, it has established numerous recreation buildings, with cinema theaters, dormitories, dining, reading, writing, and bath rooms, the quality of which may be gauged from the fact that one single establishment cost £6000.

For convenience in operations, the fleet is divided into five principal units. The first to come over, a flotilla of crack destroyers, operated in Irish waters, and made good in both offensive and defensive warfare against the submarines. Two vessels of this flotilla steamed 64,000 miles apiece during the year—a distance equal to a voyage from Liverpool to New and return each month. Thirty of them steamed 1,500,000 miles on convoy duty.

The record of the armed yachts and destroyers in French waters is equally good. In conjunction with the French and English fleets and their sister flotilla in Irish waters, they have handled the American transport trade, also many coastal convoys, with a remarkable small loss in sinkings.



LOCATION OF SINKINGS BY U-BOATS

Credit for this has to be shared with the American Naval Aviation Service, which has established many stations in France. For there is nothing the U-boat dreads more than the seaplanes—great hawks of the sea, which come booming out from the land to find and strike their steel prey.

This service also operates some stations in England, Ireland, and Italy. Some of its men were in the big seaplane fight in Heligoland Bight, when nine allied planes engaged 17 Huns. Others have fought frequent engagements. Summing the service, one may say that its work is invaluable.

A third American division operates in the Mediterranean, under severe handicaps, for the geographical features of that long and narrow sea render it an ideal ground for U-boat operations. Operating from their bases at Pola and Cattaro, on the Adriatic Sea the U-boats get two fine chances,

coming and going, at every ship. The neutrality of Spain is also in their favor, providing a city of refuge to which they can fly when hard pressed or too badly damaged to keep the seas. In spite, however, of these handicaps, sinkings in the Mediterranean have been cut down 65 per cent during the year.

Next comes the submarines, two units of which operate on bases wide apart. One holds a group of islands, which might otherwise serve as a U-boat base, while the other actively hunts them through British waters. Their work is extremely valuable, for it has increased the hardships of U-boat life several hundred per cent. Thanks to the Allied submarines, Fritz can no longer bask in the sunlight till the masts of a convoy poke up from behind the horizon; for he never knows when a torpedo may land on his solar plexus.

Having just returned from an eight-day cruise in an American submarine, I am in a position to know exactly what increased submergence means. Fritz's life—never a happy one—has through the operations of Allied submarines become insupportable. Dogged by patrols, bombed by seaplanes, voyaging always through a maze of nets and mines, he is now hunted underseas by huge steel sharks of his own kind.

Lastly, a battleship division operates with the British Grand Fleet in the North Sea, assisting in the work of keeping the German High Seas Fleet bottled up in harbor. While cruising recently, this division narrowly missed contact with the enemy, and the disappointment of the entire personnel thereat is beyond my power in words. Now they are hungering for another real chance at the Hun.

This, then, briefly sums the operations for a year of the American fleet. Space does not permit description of the real hardships and dangers of the work. In! Coal up! Out! describes the life. Blow high, blow low, it ran its convoys to break the strangler's cord of U-boats and keep the stream of ships in circulation.

This was not accomplished without a price in lives. The armed yacht *Alcedo*, torpedoed in French waters; the *Jacob Jones* sunk in the Channel; the *Chauncey*, rammed and sunk during a fog—these, with 100 of their crews and 22 other lads washed off the decks of destroyers during night storms, are the price the American Navy has paid for the safe delivery of allied supplies. But that was inevitable. Having done its duty according to its lights, the fleet asks no higher praise than that freely accorded by the man who—next to its own admiral, Sims—knows it better than any other man alive, Admiral Sir Lewis Bayley, Commander-in-Chief of the American Flotilla in Irish waters.

I want to express my deep gratitude to the United States officers and ratings for the skill, energy, and unfailing good nature which they have constantly shown; qualities that have materially assisted the war by enabling the ships of the Allied Powers to cross the ocean in comparative freedom.

To command you is an honor; to work with you a pleasure; to know you is to know the best traits of the Anglo-Saxon people.—*Land and Water*, 8/8.

YEAR'S CHANGES IN U-BOAT WARFARE.—In a review of the shipping situation, Sir Eric Geddes, First Lord of the British Admiralty, said in the House of Commons last month that a year ago, when the ruthless submarine campaign was at its height, the net loss of Allied and neutral tonnage which we were forced to contemplate was a minimum of 550,000 tons gross per month, of which 400,000 tons was British. During the past twelve months the position had changed in many directions. In the last quarter ended 30th June that loss of world's tonnage had been converted into a net gain of 100,000 tons per month, and the British net loss had been reduced to 90,000 tons per month. Allied and neutral tonnage was as well off on June 30, 1918, as on January 1, 1918, in spite of enemy's depredations. This result had been attained by reduced sinkings and

increased building. During the last twelve months 35,000 additional men had been employed in our shipyards, as compared with the original estimate. Owing to the military demands, it had been impossible to obtain the proper quota of skilled men by withdrawal from the army to the national shipyards. He was still of opinion that the decision was a right one. Owing to the driving of the submarine inshore and the increased salvage the repair of ships had enormously increased; repairs alone to-day absorbed men equivalent to 60 per cent of the total engaged on the construction of merchant ships. The position with regard to the enemy submarine was again showing signs of change. The vast majority of submarine attacks had been quite close in. Now he was finding it too dangerous to work inshore, and the sinkings were now creeping away outside the fifty-mile line. The actual results were that the attacks were fewer.—*Nautical Gazette*, 24/8.

LOSSES BY INTERNAL EXPLOSION.—Most, if not all, of the belligerent navies have lost valuable ships by internal explosion, but only in the case of Italy has the result of an investigation into such a disaster been made public. The first case of this kind in the British Navy was H. M. S. *Bulwark*, a 15,000-ton battleship, which blew up at Sheerness in November, 1914. In July, 1917, the same misfortune overtook the battleship *Vanguard*, there being very few survivors. The Japanese Navy has suffered two serious losses by internal explosion. In January, 1917, the so-called "battle-cruiser" *Tsukuba* was blown up at Yokosuka, and the 21,400-ton battleship *Kawachi* was lost through the same cause on July 12th last. There is strong reason to believe that neither the German nor the Austrian navies have been immune from similar disasters, but we are not likely to get any definite information until the close of the war. Oddly enough, the French Navy, which in former years lost two battleships—*Jéna* and *Liberté*—by internal explosion, has had no corresponding loss during the war.—*The Engineer*, 16/8.

HARD TO DETECT PERISCOPE.—*U-Boats Equipped With New Devices Which Help to Hide Them.*—If the popular conception of the periscope, and the manner in which it is brought to the surface and lowered, were accurate, chasing submarines would be a much easier task than American destroyer commanders have laid out for them. They do not see a pipe four or five inches in diameter with lenses at the top swishing through the water or disappearing during the rather slow process of submerging a U-boat.

Instead, they see, if they are fortunate enough, a slender pipe not more than one and one-half inches in diameter shoot up above the surface and disappear within a few seconds. It is the telescope perescope that may be operated from a depth of several feet. All underwater craft now are equipped with them rather than the old type which through photographs and drawings has been impressed upon many people.

The operation of the periscope is controlled to a large extent by a very delicate instrument which denotes to the U-boat commander the condition of the sea at the surface. If it is comparatively smooth, which enhances the danger of detection, he need raise the periscope only a few inches above the surface. If it is rough he must raise the "eye" higher, but he really is in not as great danger as if the water was calm because it is difficult for an observer on another ship to see the small instrument in a heavy sea.

The instrument is controlled by water pressure which varies with the height and violence of the waves and shows actual surface conditions on an indicator in the ship.

In one successful fight with a U-boat it was estimated that the periscope was visible less than 10 seconds. It came up very close to a destroyer, doubtless a great deal closer than the submarine commander had reckoned,

and when he realized his peril he attempted to scurry away. But a depth charge was dropped and German submarine power decreased by one boat.—*New York Times*, 8/9.

LIGHT CRUISER ARMAMENTS.—The particulars recently given of the new German light cruisers known as the *Mannheim* class have evoked much interest. As we pointed out at the time, it is impossible to obtain confirmation of the data then given, though they are believed to be substantially accurate. The most important feature of the new ships is their armament, for the suggested speed of 33 knots is by no means excessive nowadays. But so far as light cruisers of the pre-war period are concerned, we know of none which could stand up successfully against the *Mannheim's* broadside of two 8.2-inch and three 5.9-inch guns. Nor would it be easy to project an effective "opposite number" to this vessel without going beyond the dimensions consistent with the light cruiser ideal. Before the war, when the necessity of supplying heavier guns to cruising ships was already foreseen, the 7.5-inch was considered by some officers to be the best weapon for such a purpose. It cannot properly be classed as a quick-firer, for the 200-pound projectile is too heavy to be man-handled with facility. But though rapid fire is an important advantage in all cases, it is not the supreme desideratum, and several episodes during the war have shown that against strongly built cruising ships a limited number of heavier projectiles would probably be more effective than a hail of 6-inch 100-pound shell. From this point of view the 7.5-inch has much to commend it, though its rate of fire might be less than half that of a well-served 6-inch piece. But it is doubtful whether the 7.5-inch gun would be a really effective answer to the German 8.2-inch, which would presumably be 50 calibers or more in length, and fires a projectile 75 pounds heavier.—*The Engineer*, 16/8.

HEAVIER BATTERIES FORESHADOWED.—It may be interesting to compare the *Mannheim* with a hypothetical vessel of the same class, which we may call the "X." Both are of approximately the same size and speed, and neither has any marked superiority in protection. Whereas the *Mannheim* has a main battery of two 8.2-inch guns, "X" has two, or perhaps more, 7.5-inch. With good visibility, the German ship would have the advantage in range, and might hope to inflict serious damages on "X" before the latter's guns could reply with effect. In speed of fire the *Mannheim's* battery would probably be the superior, for her guns would be loaded mechanically, whereas the 7.5-inch weapons in the "X" would be served by hand. It may be noted here that the 8.2-inch guns in the *Scharnhorst* class were good for four rounds per minute: in the 1913 prize-firing, carried out in China, the *Scharnhorst's* fore turret, containing two 8.2-inch, discharged 10 rounds in 68 seconds. The new 8.2-inch model may be capable of a still higher rate of fire, just as it is certain to have greater velocity and range. It would seem, therefore, that a heavier gun than the 7.5-inch is needed to deal faithfully with the *Mannheim* class. Two 9.2-inch might be mounted in a fast cruiser of, say, 7000 tons, but there would be very little margin left for a secondary armament. Light cruiser development seems to be approaching that point in the international cycle which was reached about thirty years ago, when there was a tendency to give these vessels two heavy guns—8-inch in most cases, 9.2-inch and 10-inch in others—in association with an auxiliary battery of 4.7-inch or 6-inch, the prototype being the *Esmeralda*, which afterwards became the Japanese *Idzumi.*—*The Engineer*, 16/8.

FRENCH PRE-WAR DESIGN.—Apparently there are some French critics who favor a drastic reply to the growing power of light cruisers, in the shape of a large type of "cruiser-destroyer." M. Gautreau recalls that, shortly before the war. M. Bertin drew up the main features of such a

vessel, "intended for work on ocean routes and for quick raiding operations, to excel all existing cruisers, and also able to have a say, at extreme range, against super-dreadnought battleships." This vessel was to be armed with six guns of the largest possible caliber, mounted in turrets, together with a numerous secondary battery of 7.6-inch guns. Belt armor was to be dispersed with, but there was to be a thick protective deck and the bows were to have vertical armor carried to a great height, in order to resist end-on-fire, and to ensure the retention of speed after an engagement. M. Bertin estimated the displacement requisite for a speed of 33.6 knots at 30,000 tons, and 35,000 tons for 35 knots. It is doubtful whether this project would have been approved, for the fighting value of such a vessel would be problematical, and its cost enormous. At all events, a cheaper antidote must be sought for light cruisers such as the *Mannheim* class.—*The Engineer*, 16/8.

ATLANTIC

THE U-BOAT OFF OUR COASTS.—The increasing activity of German U-boats off our coasts is presumptive evidence that the submarine campaign in European waters is a failure. Were it not so, that is to say, if the Germans were sinking merchant ships at the rate which obtained a year ago, they would never remove a single U-boat from the crowded waters of Europe and end it to cruise along the 2000 miles of our Atlantic seaboard where the ships of importance are few and far between.

The Germans have sent their submarines to our coasts in the hope of terrorizing the civilian population and starting a demand that our destroyers and chasers be withdrawn from European waters for the protection of our own seaboard. In this they are going to be disappointed; first, because the American people are perfectly well satisfied to leave all questions of naval strategy and tactics to their well-proved Navy Department; and, secondly, because the Navy Department itself realizes that it is well worth while to lose a few schooners and an occasional second-rate merchant ship for the sake of giving safe convoy to the millions of American troops which we are sending, and shall continue to send, to the European battlefields.

If Bernstorff, von Papen, Boy-Ed, and the rest of the crew of ambassadorial spies which Germany maintained in this country are able to interpret the American mind, they will tell the Kaiser that the mass of sentiment which forced upon our government strong measures of preparedness, will loyally back up its government now that the nation is armed and equipped, and leave the disposition of its forces and the control of strategy and tactics to those who are in power.

It is for us as a people to maintain our sense of proportion; to climb to those heights of observation from which we can get a perspective view of the whole conflict. If we do so, we shall realize that so long as our Navy Department is able to give safe conduct to our troop ships and the major units that carry the necessary arms and supplies, we can afford to lose a few fishing boats and now and again a coast-wise steamer.

At the same time, we must remember that we have not as yet, by any means, stretched our manufacturing capacity to the limit. We can do, and we ought to do, very much more than we have done or are doing; and we ought at once to construct a fleet of vessels, specially designed to meet and defeat this U-boat warfare in our own waters. For this purpose we have a well-proved type of boat ready to hand in the most excellent boat with which that famous Italian officer, Rizzo, sank, in a single engagement, two of the largest Austrian dreadnoughts. These little craft have a high speed of, we believe, between 25 and 30 knots, and they carry two 14-inch torpedo-tubes in the bow. They have high-speed underwater lines, and, unlike our *Eagles*, they carry a flaring bow which makes them capable of maintaining speed against a head sea. An excellent boat for our waters would be one of this type, somewhat enlarged to enable it to

carry a 6-pounder chaser gun and a machine gun and a large supply of depth bombs at the stern.

If all coast-wise traffic and all incoming and outgoing Atlantic shipping were instructed to keep within the three-mile limit while off our coasts, and if this belt of water were thoroughly patrolled by a fleet of fast motor torpedo-boats of the improved Italian type, it is our belief that the Germans would very early come to the conclusion that it was not worth while to send U-boats to this side of the Atlantic.

Incidentally, the question comes to our mind as to whether, as part of their American submarine campaign, the Germans have not established a floating submarine base—say some 500 miles off our coast. German raiders have frequently managed to slip through to the Atlantic, and it should be possible for a fast mother ship to do the same. In view of this, we ask whether it would not be worth while temporarily to assign a couple of our 22-knot battle cruisers to the task of scouting in the Gulf between the West Indies and the Newfoundland coast in search of any such vessels. Our battle cruisers would be more than a match for any armed mother ship; but to send any of the lighter cruisers on this mission might expose them to the risk of being sunk by heavier gun-fire.—*Scientific American*, 24/4.

NAVY WORK IN COAST PROTECTION.—In order to maintain the full protection of the American coast, the navy has evolved a most complete system of coast patrol that has been wonderfully effective when the number of ships that are constantly traversing the waters adjacent to our coast is considered, and none of the disasters that has occurred off our shores is in any way attributable to the neglect of the Navy Department. Whenever the presence of submarines has been indicated, and that has been frequently, a complete system of warning has been sent out. The extent and character of this patrol has never been disclosed fully, but it comprises cruisers, destroyers, submarines and submarine chasers. But even with the most complete patrol it is not deemed extraordinary that an occasional submarine may slip in and destroy some shipping. It is probable that at no time have there been more than three German submarines off the coast of the United States and one of these submarines has probably been accounted for.

The report published that a commander of a German submarine told some of his victims that he had visited a theater in New York is not an impossibility. The statement has even been made by the captain of one of the wrecked ships that while in a saloon in New York he recognized and was recognized by an officer of the submarine which sunk his ship. The captain said that he was so unnerved by his experience and surprised when he saw the German that he allowed the man to escape without attempting to apprehend him. It is probable that the Navy Department does not accept the statement of the U-boat victim in its entirety, but there is no reason why a submarine might not occasionally send one of its crew ashore, as some of the submarines encountered off the French and English coasts have been equipped with collapsible boats which were used for boarding purposes. There is no denial from official sources of the statement that the German submarines have twice cut the cable along the coast. In each case the cable has been repaired within a reasonable time and search made for the submarine.

Scarcely a day passes without new ships of one type or another being added to the American Navy, and additional ships being made available for patrol duty. Devices with which the new ships are being equipped render it unlikely that a submarine will successfully avoid them once the submarine is located, but the vast space to be covered indicates the difficulty, in fact, the impossibility, of covering every foot of space. Each day decreases the menace from German submarines and increases the protection against them. The total of accomplishment by the U-boats may be summarized in the destruction of fishing craft, strewing of mines

and the sinking of one or two merchant ships, none of which accomplishments has any real military value. It has not been disclosed how many mines the navy craft have swept up, but the main channels of commerce have been kept free from them. The most serious loss caused from that source was the sinking of the U. S. S. *San Diego*. It is a fact that large numbers of ships leave American ports every day and their progress has not been retarded. There is no doubt that the German naval officials know they are going but the complete protection afforded by our navy convoys has prevented any interference by the submarines. That the lanes of travel followed by the tankers from the Mexican oil fields and from the Texas oil fields are guarded is proven by the prompt and regularly maintained delivery of fuel at the supply bases in Europe. The line of patrol vessels may be said to extend from Newfoundland to the Isthmus of Panama, and with the complete chain of naval aeronautic bases and coast guard that has been maintained it is unlikely that a submarine will be able to operate often with success at any point along this line. Every day the line is being strengthened and the chances for successful operation of submarines are being lessened.

There is reason to believe that approximately 200 German submarines have been destroyed since the beginning of the war. Official figures have been published indicating that about 170 have been destroyed, and those figures were not made up of uncertainties. It is unlikely that the German Navy, which probably has less than 125 submarines left, will attempt any extensive raiding along the Atlantic coast. So far as the operation of our navy in foreign waters is concerned, enough has been published to show that our participation with the Allies has been of material assistance and the number of American naval air bases along the British, French and Mediterranean shores is not inconsiderable, and is a strong indication of the splendid co-ordination and co-operation of our navy with the navies of our Allies.—*Army and Navy Journal*, 24/8.

U-BOAT CAPTAIN SAYS HE SANK THE CRUISER "SAN DIEGO."—Captain Myhres, commander of the Halifax-owned trawler *Triumph*, which was captured on Tuesday by a U-boat, converted into a German raider and has sunk several fishing vessels, reached a Canadian port to-day.

Captain Myhres said the commander of the U-boat declared he torpedoed the United States cruiser *San Diego* and that he had the captain of an American vessel on board as prisoner.—*Wash. Ev. Star*. 23/8.

COURT HELD MINE SANK THE "SAN DIEGO."—A naval court of inquiry after investigating the sinking of the United States armored cruiser *San Diego* off Fire Island on July 19, held that the vessel came in contact with a mine. Several mines strewn by German submarines were reported found off Fire Island the day the *San Diego* was sunk.

Captain H. H. Christy, commanding the *San Diego*, in his report to the Navy Department, however, expressed the belief that his vessel was torpedoed. He was unable to offer any positive evidence of the presence of an enemy submarine near his vessel. No submarine was sighted and no torpedo wake was seen by any of the officers or men aboard the warship.

Until the decision of the Court of Inquiry there were many reports that the *San Diego* had been sunk by a submersible. The court held that the explosion was exterior and was not caused by any defect in magazines or boiler rooms. The court held that the loss of the ship was in no way due to negligence or inefficiency on the part of Captain Christy or his crew.—*Evening Star*, 23/8.

U-BOATS RAIDING HERE ARE OF CRUISER TYPE.—German submarines now raiding in American waters are of the cruiser type, probably converted merchantmen, such as the *Deutschland*, which made two peaceful trips to the United States before this country entered the war. They are low-

speed craft, with great cruising radius, carrying large crews, 5.9-inch guns, and mine-laying equipment as well as torpedoes.

These conclusions have been drawn by naval officers from reports which have been gathered from time to time since the U-boats first appeared off the Atlantic coast last May. The largest of them probably is not more than 300 feet long, and officers are satisfied that they are not the super-submarines which reports have said Germany was building.

The raiders have made no effort to attack troop ships leaving for Europe, and none of them has been sighted by outbound transports or convoying warships. This fact, together with the general character of the operations of the submersibles, is accepted here as proof that the sole purpose of the raids is to hinder commerce and incidentally to carry German "frightfulness" to the United States.

The Germans are believed to have built six merchant submarines, and two of them, the *Deutschland* and *Bremen*, are known to have been completed before this country declared war. At least one and possibly two of these vessels have been destroyed, but the others unquestionably have been converted into fighting ships. Their great beam enables them to mount much larger guns than the ordinary U-boat, and this accounts for the fact that they have outranged nearly all of the armed merchantmen when they dared to attack. Speed has been sacrificed to cruising radius, and it is estimated that their maximum surface speed is not more than 12 knots, while they probably cannot do better than six submerged. Their slowness, officers say, makes them unsuitable for operations in the war zone, where speedy destroyers are constantly on guard, and they have been employed largely in sporadic raiding expeditions.

The cruisers are believed to have made their first appearance in the Azores last fall, where a port was shelled until an American naval collier drove off the enemy with shell-fire. Later the coast of Liberia was bombarded, and there is good reason to believe that this, too, was the work of one of the cruisers.

They are wary of warships, and the quickness with which they submerge, even at the approach of the smaller submarine chasers, tends to support the view that their commanders have been instructed not to expose them to serious attack.—*Wash. Ev. Star,* 16/8.

SUBMARINE ATTACK ON EASTBOUND CONVOY.—For a second time well within a fortnight a troop ship torpedoed by a German submarine has, through the energy and seamanship of its officers and crew and despite gaping wounds temporarily staunched, been carried onshore over a reported distance of 200 miles and safely beached. No loss of life among the 3000 and more persons embarked resulted, thanks to favoring conditions of wind and weather that permitted the promptest assistance by the convoying vessels. It is rumored that the submarine was sunk by depth charges discharged from the cordon of destroyers so quickly drawn around the center of the attack, but this lacks confirmation.

True to form, the German U-boat did not dare a bold dash to cut out a selected victim from the convoy, but, lurking unseen, withheld its bolt until a single vessel, lagging somewhat because of machinery troubles, came within safe range. Good luck surely went that day with the attacked vessel—good luck because a strong ship has been spared for further honorable duty—and it was the best luck in the world that so many gallant men escaped a disaster that might have been the most serious recorded in the oversea transportation of American soldiers.

This is the third attack delivered against troop ships eastward bound. In the other instances the transports were sunk and the destruction of life was considerable—not, perhaps, reckoned as a percentage of the total carried across, but still considerable and lamentable. The *Tuscania* lost 204 out of a contingent of more than 2000 all told and the *Moldavia* 55.

This fresh assault does not prove any increasing activity on the part of the German submarines, though the menace still exists and is so much

recognized as existing that no precaution will be omitted to augment a protection that has made these normally safe entrances and exits on the stages of the danger zones miracles in maritime adventure.—*N. Y. Herald,* 12/7.

SEIZE GERMAN NAVAL BASE IN VIRGIN ISLANDS.—Alien Property Custodian A. Mitchell Palmer announced at Washington, September 11, that the government has seized a potential German base at St. Thomas, Virgin Islands. The base consists of land, buildings, docks, warehouses, large water tanks and cisterns, lighters, loading paraphernalia and coaling facilities, all formerly owned by the Hamburg-American Steamship Line. Mr. Palmer explained that Germany had evidently considered its possibilities as a naval base because of the fact that the steamship company's principal building, which commands the harbor, is of reinforced concrete and the place in front of it is said to have an 8-foot foundation of concrete, fit for gun emplacements. One of the reasons for the purchase of the Danish West Indies by the United States was because of the fact that St. Thomas affords a natural base for the defence of the Panama Canal.—*Army and Navy Journal,* 14/9.

TWO DESTROYERS COLLIDE.—Two American destroyers had a terrific collision. One destroyer escaped with little damage, but the other had its bow turned to one side, the plates ripped away and the gear carried overboard. But the destroyers are so well built that this one did not sink. However, it will require a stay in the drydock to bring back its fine lines and refit it for chasing submarines.

(The names of the ships described above were apparently given, but the censorship eliminated them all.)—*Washington Evening Star,* 11/9.

THE "JUSTICIA."—On the 19th of July, at 2.30 p. m., the *Justicia,* formerly the *Statendam,* belonging to the Holland-Amerika line, was torpedoed off the North of Ireland while under torpedo-boat escort. The torpedo exploded in the engine-room, but the vessel remained afloat. Two hours later two more torpedoes were discharged at her. One of these missed, while the other was diverted by gun-fire from the ship. She was then taken in tow, but at 8 p. m. a fourth torpedo was discharged at her. This was again diverted by gun-fire, and the towing operations were continued. At 4.30 a. m., the next morning, a fifth torpedo was discharged at her, but missed its mark. At 9.15 a. m. two torpedoes struck her, and she began to settle rapidly, sinking finally at 12.40 p. m. The third engineer and fifteen of the engine-room staff lost their lives by the first explosion, but all the remainder of the crew were saved. Several submarines were undoubtedly engaged in the attack. One of them, at least, was sunk, and very happily by His Majesty's destroyer *Marne,* on the very day that the German troops were being driven back by the Allied troops across the river of that name.—*The Engineer,* 2/8.

THE "JUSTICIA'S" ASSAILANTS.—*The Rheinisch-Westfälische Zeitung* states that both the German submarines which participated in the sinking of the White Star liner *Justicia* off the north coast of Ireland on the morning of July 20 last have returned.—*London Times,* 16/8.

FRENCH CRUISER SUNK.—The French cruiser *Dupetit Thouars,* which was co-operating with the American Navy in the protection of shipping in the Atlantic, was torpedoed on August 7 by a submarine. American destroyers rescued the crew except 13, who are missing. The *Dupetit Thouars,* which was of 9367 tons, carried two 7.6-inch guns and eight 6.4-inch. She was launched in 1901.—*Army and Navy Gazette,* 24/8.

COAST GUARD MEN NOT GASSED.—Unofficial information received by Secretary of the Navy Daniels from officers of the North Carolina Naval District shows there is no foundation for the report made to Colonel A. W. Chase, C. A. C., at Fort Caswell, N. C., that at the station and lighthouse on Smith's Island, off the mouth of Cape Fear River, near the entrance to the channel to Wilmington, N. C., on August 10, six men of the station had been gassed by a German submarine. The account was given with much particularity, it being explained that the men suffered from the effects of the gassing for thirty-five or forty minutes, the gas having been released from oil spread on the water. Navy officials at Washington were skeptical of the report at the time, Secretary Daniels saying on August 14 that he was convinced "no German submarine gassed the Coast Guard and lighthouse men on Smith's Island." It was added that he was awaiting a written report of the alleged occurrence from the Coast Guard men on the island.—*Army and Navy Journal.*

STEAMER SINKS U-BOAT.—Newspapers of Oporto, Portugal, report that an unidentified steamer outbound from Bordeaux sunk a submarine near the Spanish coast. There are no details of the incident.—*Evening Star,* 20/8.

DISPATCH BOAT SINKS U-BOAT OFF BRITTANY.—The dispatch boat *Oise* has been cited in an army order for having sunk an enemy submarine August 5 off the coast of Brittany.—*Evening Star,* 27/8.

BRITISH SHIP KELLOGG, FIRST REPORTED SUNK, SALVAGED AND IN PORT.—The Navy Department announces that the British steamship, *Frederick R. Kellogg,* torpedoed on August 13, has been salvaged and towed into port. First accounts of the attack on the *Kellogg* stated that the vessel had been sunk, but later reports showed it still afloat. Its recovery was accomplished by naval salvage operations.—*Official Bulletin,* 30/8.

THE "CUBORE" SUNK.—The United States steamer *Cubore,* 7300 gross tons, was torpedoed and sunk on August 15 in European waters on westbound voyage. Reports state that there was no loss of life in the sinking of the *Cubore.—Naval Bulletin,* 16/8.

MOTOR SCHOONER SHELLED AND SUNK BY HUN SUBMARINE.—Captain Frederick Rouse and twenty-one survivors of the American motor schooner *Madrugada,* arrived at an Atlantic port on board a Norwegian fruit steamship following the sinking of their vessel by gunfire from an enemy submarine early August 15.

The *Madrugada* came to grief on her maiden voyage, thirty-five miles off Winter Quarter Shoals, Va., and her crew escaped unscathed only because they kept their sinking schooner between them and the U-boat.

It was at half-past seven o'clock Thursday morning that the watch on the *Madrugada's* deck shouted a warning that a submarine had appeared. The sea pirate was about 200 yards off the *Madrugada's* port, and opened fire with her single gun forward without any preliminaries.

Captain Rouse and his men cleared their lifeboat over the starboard rail without waiting a minute, for the shells from the U-boat came piling into the *Madrugada's* port side, mostly below the water line.

By keeping in the lee of the schooner those in the lifeboat escaped being shelled, for the submarine commander did not seem to care whether he hit the sailors or not.

Eleven Shots Fired.—After eleven shots had been fired the shelling ceased and Captain Rouse and his men noted the U-boat remaining on the surface, those on her evidently watching the effect of the shelling from their conning tower, for no one appeared on the U-boat's deck.

The *Madrugada* sank rapidly, the tops of her masts disappearing after an hour had elapsed. Although then exposed to the submarine, those in the schooner's lifeboat were not interfered with, the submarine submerging just as the top of the *Madrugada's* mast disappeared beneath the surface of the sea.

Captain Rouse said that the attack had come so suddenly that none of his crew had an opportunity to save anything, and all of the men were shoeless when they were picked up four hours later, by the Norwegian fruiter. There were four Chinese in the crew and they were speechless with fright long after they had been taken on board the Norwegian.

U-Boat Was Weatherbeaten.—According to Captain Rouse, the U-boat was a weather-beaten craft with a single gun, mounted aft, and a single periscope. Her length was variously described by the survivors as from 250 to 400 feet, but none on the *Madrugada* took a very long look at the enemy vessel.—*New York Herald,* 17/8.

UNITED STATES CARGO STEAMER "MONTANAN" TORPEDOED IN FOREIGN WATERS.—The Committee on Public Information issues the following:

The Navy Department is informed that the steamship *Montanan* was torpedoed and sunk in foreign waters on August 16. Eighty-one survivors were landed. Five men are reported missing—three members of the civilian crew and two of the naval armed guard.—*Official Bulletin,* 24/8.

BRITISH SHIP "ESCRICK" TORPEDOED; 13 IN PORT.—The British steamer *Escrick,* 4151 tons, bound from Bordeaux to Montreal, was torpedoed on the night of August 16 when about 500 miles off the French coast.

Thirteen survivors of the crew of 37 have arrived here on an oil tanker, which picked them up.—*Evening Star,* 2/9.

TANKER VICTORIOUS IN U-BOAT FIGHT.—A 400-foot enemy submarine was sunk off the Atlantic coast by the gun crew of a British tanker, according to an officer of the tanker.

The tale of the battle between the tanker and U-boat was told to-day by John Crosby, chief officer of the tanker, in his bed in a hospital, where he is undergoing treatment for shock.

Mr. Crosby is said to be in a serious condition. A remarkable feature of the case is that he felt no ill-effects during the engagement, which took place last August 16, and apparently was in good health until yesterday morning. Then, safely in port, he collapsed.

"The second mate was on the bridge about three o'clock in the afternoon," Mr. Crosby said. "There was never a sign of any craft around, but he caught the streak of a torpedo coming toward the tanker. He yelled, and our vessel was thrown out of her course. The torpedo missed by a few feet. Every one was on deck by that time, but we saw nothing of the U-boat.

"What we did see was another torpedo. We zig-zagged, dodging the missile just as prettily as could be. It went by us. Then the submarine came out of the water with her guns ready. She was all of 400 feet long and could make 17 knots an hour. Our vessel was good for 11½ knots, but we began to go, with the U-boat coming on behind. She opened up with her guns and the fight started.

"I was acting as spotter for the gunner, calling the shells as they kicked up the water about the U-boat. Our 26th shot took the submarine right. She did not slow up with a bang. What she did was to swing around slowly and drift broadside on. We did not slow down, but made for port as swiftly as we could travel. I am sure our shot destroyed the enemy craft."—*New York Herald,* 21/8.

REPORTED SAFE IN PORT.—The Navy Department is informed that the steamship *West Bridge,* which was reported torpedoed in foreign waters on August 16, was not sunk, but has reached port.—*Official Bulletin,* 7/8.

NO NEWS OF SINKING OFF NANTUCKET.—At the Navy Department it was said no report had been received as to the sinking of a German U-boat by a British tanker, August 16, 300 miles northeast of Nantucket, as reported in press dispatches. Navy officials said that reports are received almost daily of the sinking by merchantmen of submarines on this side of the Atlantic, but in most cases the reports were found to be in error upon investigation.

Officials upon learning of the reported battle between the submarine and the tanker were at a loss to understand how the tanker could have been in the position indicated in the course of a trip from Mexico to Philadelphia.—*Washington Star*, 20/8.

TORPEDOED "MIRLO'S" CREW SAVED THROUGH SEA OF FIRE.—Secretary Daniels authorizes the following:

Coast Guard headquarters has received from Keeper John A. Midgett, of Station No. 179, located 15 miles north of Cape Hatteras, N. C., the following report of the rescue of the master and 41 officers and men of the torpedoed British steamer *Mirlo:*

"At 4.30 p. m. on August 16 the lookout reported seeing a great mass of water shoot up in the air which seemed to cover the after portion of a steamer that was about seven miles east by south from the station. A great quantity of smoke was immediately seen to rise from the after part of the ship, which continued on her course for a few minutes when she swung around and headed for the beach. Fire was now seen to shoot up from the stern of the steamer and heavy explosions were heard. The Coast Guard crew immediately launched their power surf boat through the heavy sea on the beach and headed for the burning wreck.

Met Five Miles Out.—"When about five miles offshore one of the steamer's boats with the captain and 16 men was met. Upon inquiry it was learned that two other boats were in the vicinity of the fire and that one was capsized and the captain feared that all of the crew of that boat had perished in the burning sea. The Coast Guard keeper directed the captain where and how to go and await his arrival, but not to attempt a landing, as the sea was strong and there was great danger of capsizing his boat without assistance.

Headed for Blazing Wreckage.—"The lifeboat then headed to the burning mass of wreckage and oil. Upon arrival the sea was found to be covered with blazing gas and oil. There appeared to be great volumes of flame about 100 yards apart, and the ocean for hundreds of yards covered with flame. In between the two large bodies of flame, at times when the smoke would lift, a boat would be seen bottom up with six men clinging to it and a heavy swell washing over the boat. With extreme difficulty the Coast Guard boat ran through the smoke and floating wreckage and rescued the six men from their upturned boat. The rescued men stated that at many times they had been compelled to dive under the water to save themselves from being burned to death. All had burns, but none was in a very serious condition. They also stated that they had seen some of their crew sink and disappear in the burning sea. The life-savers continued their search in the vicinity, but no more men could be found.

Third Boat Sighted.—"As one boat was still missing, the lifeboat was headed before the wind and sea, and in a short time the third boat, with 19 men, was sighted, and it was found to be overloaded and so much crowded that the men in it could not row and were drifting helplessly with the wind and sea about nine miles southeast of the station. The lifeboat ran alongside and took the steamer's boat in tow. The first boat was then picked up and also towed to within about two miles south of the station, when the wind from the northeast began to freshen and a heavy sea was running on the beach. It had now become very dark, and it was decided to make a landing. The two ship's boats were anchored about 600 yards off shore, and after great difficulty all passengers were safely

landed through the surf in the power lifeboat. As fast as the rescued men were landed they were taken to Coast Guard Station No. 180, where proper medical aid was given them and each survivor furnished with dry clothes, with which all coast guard stations are supplied. The following morning all of the shipwrecked men were taken aboard a patrol vessel and transferred to Norfolk, Va."—*Official Bulletin*, 5/9.

SUNK FOR LACK OF NEUTRALITY PROOF.—Captain H. Thorbjornsen, of the Norwegian steamer *San Jose*, which was sunk by a submarine off the North Atlantic coast August 17, told to-day how he had protested against the destruction of his ship on the ground that it was under charter to the Norwegian Government. The U-boat commander asked that the charter be produced. There was no copy aboard, although the captain exhibited a letter showing the *San Jose* had been chartered by the government of Norway to carry foodstuffs from the United States to the Norwegian food commission.

After reading the letter, Captain Thorbjorsen said, the German conferred with another officer of the submarine, who subsequently told that he formerly was in command of a Hamburg-American liner and lived in the United States before the war. The conference was quite animated, but the captain of the *San Jose* was informed that as he could not establish proof of his statement the vessel would be sunk.

The crew was allowed a half hour to get their belongings and take to a lifeboat.—*N. Y. Herald*, 21/8.

OFFICER AND 3 MEN KILLED; 22 HURT BY THE EXPLOSION OF DEPTH BOMB ON "ORIZABA."—The Navy Department is informed that Lieut. Commander Price Williamson and three enlisted men were killed; Commander R. D. White, in command of the *Orizaba*, and 22 men wounded by the explosion of a depth charge on the U. S. S. *Orizaba* at sea on August 17.

The Navy Department announces that a court of inquiry has been formed to investigate the cause of the accident. No material damage was done the vessel, reports state.

Commander R. Drace White, in command of the *Orizaba*, in his report says:

"I wish to invite attention to the remarkable behavior of the officers and men immediately subsequent to this explosion. About 90 minutes later a submarine was sighted coming from abaft the port beam. In spite of the fact that half of the after gun crew had been hurt and that there was every reason for demoralization, the guns were promptly manned and were ready to fire almost immediately.

"I wish especially to invite attention to the work of Surgs. Winn, Skillern, and Krepps. These officers worked incessantly from the time of the explosion until daybreak next morning. The most modern methods were employed and many men who might have suffered serious consequences were about the decks next day, manning their guns. So far there has not been a single case of infection.

"Finally, I wish to say of the ship that I have never known such spirit to exist in any of my previous service. Officers and men alike have risen to their responsibilities in a manner truly amazing. There has been a splendid spirit of loyalty and co-operation."

Commander White, who was standing nearby when the explosion occurred, was thrown to the deck, his clothes torn off, jaw broken, and kneecap fractured. Lieut. John C. Tyler was injured in the knee, chest and elbow. Most of the men wounded were only slightly injured.

Lieut. Commander Williamson, who was killed on the *Orizaba*, was born on August 10, 1884, at Norfolk, Va., and entered the naval service as a midshipman from Minnesota on June 29, 1903; was appointed as ensign September 13, 1908; promoted to lieutenant (junior grade) September 13, 1910; promoted to lieutenant July 1, 1914; and later served on the *Galveston*. In 1916 he was inspector of ordnance and powder in charge of

naval magazines and chemical laboratory at Olongapo, P. I. On August 31, 1917, he was temporarily appointed a lieutenant commander. On February 6, 1918, he was detached from the ammunition depot, Olongapo, P. I., and ordered to the United States. On April 4, 1918, he reported for duty in connection with the fitting out of the U. S. S. *Orizaba*, and had been executive officer of that vessel since it was commissioned.—*Official Bulletin*, 24/8.

RAMMED AND SUNK U-BOAT, AMERICAN CAPTAIN REPORTS.—The Committee on Public Information issues the following:

The Navy Department is informed that the captain of an American steamer reports that his vessel rammed a submarine about 9.30 p. m., on August 17 near Winter Quarter Shoals, off the Virginia coast. The captain stated that the submarine was struck on her port bow, bringing her alongside. The crew of the submarine hailed his ship, saying they were friends. The voices, he says, had a strong German accent. Replying that "They were no friends of his," the captain says he left on his course. The steamer is now in port with a badly damaged bow and a quantity of water in her hold. The captain thinks he sank the submarine.—*Official Bulletin*, 21/8.

CARGO STEAMER TORPEDOED.—The U. S. cargo steamship *Joseph Cudahy* was torpedoed at sea about 700 miles from the English coast about 12.30 a. m., August 17. Thirteen members of the crew were rescued; 62 are reported missing. According to the captain's report, two submarines figured in the attack. Two torpedoes struck the ship, the first striking the fuel tanks and the second the engine room. The captain was taken aboard one of the submarines and questioned.

Of the naval armed guard on board the *Cudahy*, 2 are reported saved and 22 missing. The Navy Department was informed later that the 22 members of the armed guard were picked up by two English steamers and arrived at an Atlantic port August 31. Sixteen members of the merchant crew have also been brought to another American port by an English steamer.

The Navy Department is informed that the two members of the naval armed guard of the *Joseph Cudahy* who were picked up 65 miles off the Spanish coast had been afloat in an open boat for six days before they were rescued. The *Cudahy* was sunk August 17 about 700 miles from the British coast, and the nearest point on the Spanish coast was more than 300 miles distant. The two men were William Joseph Hermann, seaman, second class; mother, Mrs. Elizabeth Hermann, 160 Arlington Street, San Francisco, Cal., and Henry Beckmann, seaman, U. S. Naval Reserve Force; sister, Minnie Heinz, 2849 Steiner Street, San Francisco, Cal.

The other members of the armed guard were rescued by other steamers and brought to an Atlantic port.—*Army and Navy Register*, 7/9.

NAVAL VESSEL PICKS UP 26 SURVIVORS FROM BARK SUNK SATURDAY BY U-BOAT.—The Navy Department is informed that a naval vessel picked up two boats carrying 26 survivors from the Norwegian bark *Nordhav*, which they reported was sunk by a submarine at noon Saturday, August 17, about 120 miles southeast of Cape Henry. This accounts for all the crew of the *Nordhav*.—*Official Bulletin*, 19/8.

FREIGHT SHIP BELIEVED SUNK OFF FIRE ISLAND.—A British freight steamship may have been sunk by a German submarine between 40 and 50 miles off Fire Island on Tuesday evening. That such a vessel was attacked by a U-boat was reported at an Atlantic port yesterday by officers of a steamship that formed part of a westbound convoy.

An S. O. S. was picked up by this steamship on August 19, when it was nearing the coast. The message stated that the sender was at that time being shelled by a submarine, approximately 40 to 50 miles from Fire Island.—*N. Y. Herald*, 22/8.

U-BOAT LANDS HUN OFFICER.—Information has been received in Washington from an apparently authoritative source that one of the officers of a German submarine raider operating off the Atlantic coast has been in New York City.

The submarine officer was recognized in a saloon by two of the men who were taken aboard the U-boat from one of the vessels it had sunk. Before he could be arrested he disappeared.

This incident fortifies the belief that has existed for some time in naval quarters that the mission of the submarines was more than merely sowing mines along the American coast and destroying American shipping. It now is thought the German Government is using submarines to ascertain what this country is doing in the way of war preparations and to gather military information.

Although the recognition of the German submarine officer rests only on the testimony of the two men who say they saw him, naval officers do not regard it as improbable that messengers from U-boats have been landed on American shores. German submarines could approach the coast at many points under cover of darkness and send men ashore in the collapsible small boats they carry. The risk involved would be comparatively slight.

It is not improbable, navy officers maintain, that the German officer reported seen in New York is already on his way back to Germany. It has been definitely established that three submarines participated in the recent raids on the American coast. Two of these seemingly have disappeared, one of them since was bombed by hydroplanes and submarine chasers.

Because of the safeguards established by the Navy Department the submarines have resorted to other means than the destruction of vessels. Mines have been sown, and one of the raiders appears to have been a cable cutter. Two cables were severed. Both have been repaired.—*N. Y. Herald*, 26/8.

CAPTURE OF TRAWLER "TRIUMPH."—The Navy Department is informed that the master of the steam trawler *Triumph*, who was landed with his crew at Canso, Nova Scotia, stated that the *Triumph* was captured by an enemy submarine 60 miles south by west of Cranberry Island about noon August 20, and that two guns were mounted on the *Triumph*, presumably for use of the trawler as a raider among the fishing fleet.

The navy is taking steps to protect fishing vessels and to prevent any further damage by the alleged raider.—*Official Bulletin*, 22/8.

"TRIUMPH" KEEPS UP FISHING FLEET RAID.—The American schooner *Sylvania* was sunk August 21 by an armed trawler on the Banquereau fishing banks.

It is presumed the attacking vessel was the trawler *Triumph*, captured Tuesday by a German submarine and manned as a raider. The *Sylvania's* crew reached a fishing port near here this morning.

Destruction of another fishing schooner was reported with the arrival at Gabarus, Cape Breton, of 16 of the crew of the *Dela Garde*. They said their vessel was sunk on the fishing banks by a submarine.

One of the men is injured. A dory containing three of the crew is missing.

The trawler also sank the Nova Scotia fishing schooner *Pasadena*. The crew, which reached port to-day, reported that their vessel was sent to the bottom at midnight Tuesday.

The rescued crew of the fishing schooner *Lucille Schnare*, which reached port last night, reported that the *Pasadena* was nearby when their craft was destroyed by gun-fire and bombs. When they left the vicinity in small boats they said no attack had been made on the *Pasadena*.

The *Sylvania* was built in 1910 at Gloucester, Mass., and was registered at 136 tons.

Six fishing schooners so far have fallen victim to the *Triumph*, whose German crew of 16 men, according to rescued crews of vessels she has sunk, have been operating with two guns and a wireless outfit aboard the captured trawler.

The *Triumph*, a steam vessel said to have 20 days' coal supply in her bunkers, was seized by a U-boat commander, who told the trawler's company that he proposed to conduct a general raid against the Grand Banks fishing fleet.—*Washington Evening Star*, 25/8.

TWO MEN DEAD, FIVE MISSING FROM U. S. MINE SWEEPER.—The Navy Department is informed that two men are dead and five missing of the crew of the mine sweeper *Montauk*, which was driven ashore and wrecked in a gale on the Florida coast August 21.

The dead are:

Joseph E. McCurry, yeoman, third class; wife, Mrs Fanny May McCurry, 220 South Waverly Street, Florence, S. C.

Roy E. Travis, fireman, third class; mother, Mrs. Biddie Coppadge Travis, 120 Stonewall Street, Atlanta, Ga.

The missing:

Obed L. Nicholas, fireman, third class; mother, Mrs. Mattie Nicholas, Blackstock, S. C.

William L. Sample, seaman, second class; mother, Mrs. Addie Sample, Newberry, S. C.

Jacob O. Singley, seaman, second class; mother, Mrs. Anna Singley, Prosperity, S. C.

Frank S. Stewart, seaman, second class; mother, Mrs. M. J. Stewart, Simpsonville, S. C.

Jennings Sudduth, seaman, second class; mother, Mrs. Alice Sudduth, 11 Hale Street, Greenville, S. C.—*Official Bulletin*, 27/8.

BRITISH STEAMER SUNK.—A British steamer has brought to New York 104 survivors of the British steamship *Diomed*, sunk on August 21 about 250 miles east of Nantucket.—*Official Bulletin*, 25/8.

"LAKE EDON," ARMY CHARTERED CARGO TRANSPORT, IS SUNK BY U-BOAT IN FOREIGN WATERS.—The Navy Department received a cablegram August 22 stating that the steamship *Lake Edon*, an army chartered cargo transport, was sunk by an enemy submarine in European waters on August 21. There were 49 in the crew; 16 are reported missing. The names of those missing were not given in the dispatch.—*Official Bulletin*, 25/8.

BRITISH SHIP ELUDES U-BOAT OFF NANTUCKET.—A British freight steamship which arrived from European waters was attacked by a submarine August 22 when near Nantucket. One torpedo was fired by the U-boat which missed the freighter about 20 yards, men of the crew said.

The submarine then began shelling the ship and the fire was returned by the Britisher. A running fight lasting more than an hour followed, the freighter finally outdistancing the submarine. None of the shots fired by the U-boat took effect.

Evidence of probably additional, and so far unidentified, ravages by enemy submarines along the Atlantic coast were brought in to-day by officers of a small coastwise sailing vessel. August 18, the officers said, when about 13 miles southwest of Cape Hatteras Light, they passed the hull of an iron vessel 300 feet long floating bottom up. The day following, in the forenoon, when 11 miles off Winter Quarter Shoal, the dismantled hull of a large schooner was sighted. The same day, at 4 p. m., seven miles east of Five Fathom Bank lightship, a four-masted sunken schoner was passed, the topmasts protruding from the water, their condition indicating the vessel had been but recently sunk. Soon afterwards two lifeboats which were not marked were picked up.—*Washington Evening Star*, 23/8.

SEAPLANE IS SUNK.—Loss of a naval seaplane, with her crew of three, including Ensign Donald C. Pero, in collision with another seaplane off Fire Island August 24, was announced to-day by the Navy Department.

Pero's machine is believed to have sunk immediately after falling into the water. Mine sweepers searched the vicinity, but could discover no trace either of the crew or of the plane.

Ensign H. Stevens, piloting the other plane, landed safely on the water with his mechanic and assistant and aided in the unsuccessful search. The accident occurred about 7 o'clock in the evening.

The two men missing with Ensign Pero are W. C. Jaegel, chief machinist mate, and F. A. Newman, machinist mate.—*Evening Star*, 26/8.

U-BOAT SINKS U. S. SCHOONER AND THREE CANADIAN FISHING BOATS.—The Navy Department is informed that the members of the crew of the Canadian fishing schooner *E. B. Walters*, who landed at St. Pierre Sunday night, reported that the *Walters* was bombed and sunk by a submarine August 25, 35 miles off Point Platte, Miquelon, and that the American schooner *F. J. Flaherty* and the Canadian fishing schooners *C. M. Walters* and *Morris B. Adams* were also sunk. The crews, numbering about 30 men, were reported on their way to St. Pierre.—*Official Bulletin*, 27/8.

DETAILS OF SINKING OF SUBMARINE CHASER 209.—Reports received by the Navy Department give further details of the sinking of submarine chaser 209. The captain of the steamship *Felix Taussig* reported that at 2.30 a. m., August 27, the lookout reported an object resembling a submarine about 200 feet away, off the port beam. Orders for general alarm were given by the captain. The craft sighted had no lights showing and was headed in the same direction as the *Taussig*, the captain said. As it passed the steamship and crossed her bow, four shots were fired from the forward gun of the *Taussig*. It was only after the third shot that the vessel showed lights, the report stated. Apparently two shots struck the submarine chaser, and it is believed that one shot exploded a depth charge. The *Taussig* stopped to render assistance to the sub chaser, which was burning and which sank in about three minutes.—*Official Bulletin*, 30/8.

SINK TWO SCHOONERS; CAPTAINS PRISONERS.—Twenty men from the fishing schooner *Elsie Porter*, of Lunenburg, N. S., and five from the schooner *Potentate*, of La Have, N. S., landed August 29 at St. Johns, N. F., reporting that their vessels were sunk by a German submarine August 27. The captain of the *Porter* was held a prisoner on the submarine.

Survivors said that the captain of the *Potentate* might also be a prisoner, as he and members of the crew in his boat had not been seen since the sinking.—*N. Y. Herald*, 3/9.

NEW FISHING SCHOONER "RUSH" IS SUNK BY U-BOAT.—The new American fishing schooner *Rush*, of Boston, was sunk August 26 by an enemy submarine while on the fishing grounds off this coast.—*Washington Evening Star*, 27/8.

"ONEGA" SUNK AUGUST 29.—The American steamship *Onega* has been torpedoed. The vessel foundered August 29. Twenty-nine persons were saved. Twenty-six are missing. Many bodies have been washed ashore.—*N. Y. Herald*, 3/9.

"A CANADIAN ATLANTIC PORT" reports that 159 men, comprising the crews of a Norwegian steamer and five French fishing-schooners, recent victims of a German submarine, have arrived on a trawler. They were picked up off the Grand Banks.—*Literary Digest*.

SUBMARINE SUNK BY AMERICAN STEAMER.—The clever sinking of a large German submarine by a navy gun crew aboard the American steamer

Frank H. Buck, off the Atlantic coast on September 3, was announced by the Navy Department on September 10, after the report of the captain had been received. Two shots from the steamer struck the submarine squarely, and she blew up and went to the bottom. The Navy Department announced that the captain of the *Buck* highly commended the efficiency and conduct of Chief Gunner's Mate Joseph Steffens, U. S. N., and the entire armed guard under his command.

The engagement lasted 29 minutes. The submarine was about 300 feet long, of the early type of German submarine with high bow, and had two 6-inch guns close to the conning-tower, fore and aft. She fired in salvos, using about 60 shots altogether. She was camouflaged and flew no flags.

The submarine was sighted on the starboard beam at 4000 yards. She opened fire with two 6-inch guns. The steamer answered fire with forward guns, and the shot fell about 400 yards short. She then swung astern forward to submarine, using after guns. Shots were very close to the submarine and the submarine's shrapnel was bursting very near to the steamer, some of the pieces falling upon deck amidships. The steamer changed course frequently, which seemed to upset the submarine's aim and range.—*Army and Navy Journal*, 18/9.

U. S. CARGO SHIP "LAKE OWENS" SUNK BY GUN-FIRE; FIVE MISSING.—*Twelve of Crew and One Man of Armed Guard Wounded; Survivors Landed.*—The Navy Department is informed that the steamship *Lake Owens* was sunk by gun-fire in foreign waters on the morning of September 3. All the members of the naval armed guard were saved; only one, Chief Boatswain's Mate H. W. Lincoln, being reported in hospital, and his injuries are not regarded as serious. Five of the ship's crew are reported missing. All the other members of the crew have been landed, six seriously wounded and six slightly injured. The names of these were not given in the dispatch.

The *Lake Owens* was an army cargo ship of 2308 gross tons.—*Official Bulletin*, 6/9.

TORPEDO THE "MOUNT VERNON."—The Navy Department received a dispatch from Vice-Admiral Sims stating that 35 men were killed by the explosion when the U. S. S. *Mount Vernon* was struck by a torpedo. The *Mount Vernon* has reached port and all the other members of the crew are reported saved. Senator James Hamilton Lewis, of Illinois, was on the ship, returning from Europe and was among those reported safely landed.

The *Mount Vernon* was torpedoed September 5 about 200 miles from the French coast, but put back to port under her own steam. The dispatch states that the torpedo struck the ship on the starboard side, flooding No. 4 fireroom, but the extent of the damage is not stated.

Vice-Admiral Sims, in a dispatch received by the Navy Department, gives further particulars of the torpedoing of the U. S. S. *Mount Vernon*. A periscope was sighted 500 yards off the starboard bow and the guns opened fire. At almost the same moment the torpedo struck the ship. It hit abreast the bulkhead between boiler groups 3 and 4. Firerooms 5, 6, 7, and 8 were flooded. The loss of so many lives, 35 being killed, was due to the fact that the watch was being relieved and there were many more men than usual in the firerooms. Neither periscope nor submarine was sighted by the escorting destroyers, but a number of depth charges were dropped at the point where the periscope was sighted by the *Mount Vernon*, which proceeded to port at a speed of 15 knots and is now docked for repairs. Vice Admiral Sims' remarks on the "admirable conduct" of officers and crew, showing their thorough training for such an emergency and the "great skill and ability" with which Captain Dismukes handled the situation.

Secretary Daniels has received the following cablegram from Secretary of War Baker, who is now in France: "I have just visited and viewed the *Mount Vernon*. The high spirited morale of its men and the masterful

seamanship of its captain and officers make such a stirring story of heroism that I wish all the nations might know the splendid way in which that huge transport met and foiled the attempt to destroy it at sea. The traditions of your service are enriched by the conduct in this emergency."

Captain Douglas E. Dismukes, U. S. N., is commander of the *Mount Vernon.—Army and Navy Register*, 14/9.

TROOPSHIP TORPEDOED—ALL SAVED.—A British troopship, carrying 2800 American troops to England from the United States, reported unofficially to be the White Star Line steamer *Persic*, of 12,042 tons, was torpedoed by a German submarine off the English coast at 3 p. m. September 6. Owing to the fine discipline of those aboard and the skill and seamanship of American and British destroyers convoying the *Persic* and other transports, not a man on the transport was lost or injured. The transport under her own steam was beached on the coast many miles from the scene of the attack. Considering the great hole the torpedo made in the hull of the steamer, this was a fine piece of seamanship. The steamer with her gaping wound and down by the head stopped until all the troops had been transferred to other ships, and then headed for the shore. It is believed that she can be salvaged.

Unofficial reports state that it is believed the submarine was sunk by a depth bomb, but at this writing there is no certainty as to this. When the troops arrived in England, the American Red Cross rushed large quantities of supplies to their camps. According to the Associated Press account all the men were taken off the transport by the destroyers soon after she was hit. The sea was calm and it was not necessary to launch the lifeboats. The men descended from the decks of the transport to the destroyers by means of ropes. The transport was a part of a large convoy, and owing to trouble with her engines she was forced to lag behind the other vessels until the trouble was overcome. The necessary repairs had been made to her engines and she was proceeding to catch up with the other vessels when she was attacked. The torpedo struck her just forward of the engine room. She immediately began to settle, bow first.

The *Persic* is the third transport carrying American soldiers to the war zone to be attacked with any degree of success by U-boats. The other two vessels were the Anchor Line steamship *Tuscania*, under charter to the Cunard Line, torpedoed February 5 off the Irish coast with a loss of 204 men, and the Peninsular and Oriental liner *Moldavia* torpedoed May 23 in English waters with a loss of 56.—*Army and Navy Journal*, 24/9.

U-BOATS DISGUISED AS FISHING CRAFT.—Two German submarines disguised as fishing craft and carrying sails are operating a few hundred yards off the Atlantic coast, according to information transmitted to the naval authorities by the officers of British and French steamships arriving here.

Officers of the British vessel said they became suspicious of two sailing vessels sighted about dawn travelling six miles apart. Suddenly the sails came down and puffs of smoke appeared. The English captain crowded on speed and escaped after an all-day zigzag flight.

The French vessel reported an encounter at about the same locality, the Frenchman fighting off the submarine after an engagement lasting several hours.

A floating mine of German type, thought to have been one of those placed in waters off the Long Island coast by a German submarine recently, was discovered off the beach at Fire Island by a United States patrol boat to-day and brought ashore. Engineers who took the mine apart said that it weighed about 200 pounds, but was not in condition to explode, owing to defective wiring. After the destruction of the United States cruiser *Santiago* off Fire Island, July 19, a number of mines were picked up by mine sweepers.—*Washington Post*, 8/9.

THE "GALWAY CASTLE" IS SUNK BY U-BOAT; 90 WOMEN AND CHILDREN ARE AMONG 120 PASSENGERS LOST.—The British steamship *Galway Castle* was sunk by an enemy submarine September 12, when she was two days out from a British port and bound for South Africa. One hundred and twenty of her passengers, 36 naval and military officers and 33 of the crew of the steamship are missing, making a total of 189 persons. Among them is Major Rabuntine, a member of the South African Parliament.

There were 960 persons aboard the vessel when she was torpedoed without warning. In the passenger list were 300 women and children. The bodies of three children who had died from exposure have been brought ashore at a British port.

The *Galway Castle* was in a stormy sea when the torpedo that struck her was launched by the undersea raider. Despite the heavy sea attending steamships succeeded in rescuing many of the passengers whose lifeboats had been driven against the vessel's propeller and smashed. Many of these survivors were picked up after they had managed to keep afloat by means of their life belts and wreckage.

Henry Burton, Minister of Railways of the Union of South Africa, was among those reported saved.

The captain of the *Galway Castle* and several officers were reported to have still been aboard the sinking ship when she last was seen. True to British traditions of the sea, they are believed to have perished when their ship went down.

When last seen the vessel was sinking fast. This was two days after she was attacked by the submarine.

The *Galway Castle* was of 7988 tons gross register, and left a British port last Tuesday.

The Union Castle Mail Steamship Company owned the British steamship *Galway Castle*, torpedoed by a submarine. No details regarding the sinking had been received yesterday at the company's offices here, and nothing was known regarding the personnel of those on board.

The vessel was thought to have been in government service. Prior to the war she ran between England and South Africa carrying passengers.

The *Galway Castle* was built at Belfast in 1911. London was her port of register.—*New York Herald*, 16/9.

HUNS SHELL SHIP NEAR NEW YORK.—A large British passenger steamship now in the transport service arrived September 10 at an Atlantic port from a port in England after having been shelled by a German submarine last Saturday evening within 90 miles of the port of New York. The attack upon this vessel proves conclusively that U-boats are again operating in waters not very far from the principal American Atlantic ports.

The voyage of the British vessel had been uneventful up to late Saturday. Early in the evening a dense fog settled over the water and the 96 passengers, most of whom were Canadian and British officers en route to Canada for duty there, had spent a quiet evening on deck in utter darkness or in the smoking room behind closed doors and tightly curtained port lights.

A score of the military men were on deck outside at half-past eleven o'clock, when several of them saw a flare off the starboard side, apparently less than half a mile away. Almost simultaneously a shell whistled over the forward deck of the steamship, burying itself in the sea with a loud explosion some 200 yards off the port bows.

The strange part of the incident was that there had been no detonation when the shell was fired. The only noise came when the thing exploded in the sea.

"Somebody wants to look us over," said one of the Canadians at the rail.

Shot Was Intended to Hit.—"Look us over nothing!" replied another officer. "That shot was intended to hit us!"

Immediately after the shell had whistled over the forward deck, just forward of the bridge, the British vessel's course was changed and she was swung over to port, laying a course almost directly southeast.

She had barely straightened out on her new course when a second shot came whistling over her forward deck, this time from the port side, and spent itself in the sea off the starboard bow.

The lookout on the after bridge had in the meantime communicated with the navigating bridge to the effect that a submarine was "in pursuit hard astern."

"Let her pursue and be damned!" was the laconic reply from the captain.

All possible steam was ordered put on and a speed was developed far above that which had marked the voyage across the Atlantic up to that moment.

Zigzagging away with all possible speed, three more shots were sent after the fleeing Britisher by the submarine. In each case those on her decks saw the flare of the shot as it was fired, but failed to hear any detonation until the shell struck in the water. The British vessel was drawing well away from the enemy when the fifth shot was fired, and that was the last that was heard of the sea pirate.—*New York Herald*, 16/9.

NORTH SEA AND CHANNEL

BIG WORK OF NAVY SHOWN BY REPORT OF ONE OVERSEA BASE.—Some idea of the work of the Entente Allied navies in European waters is shown by interesting figures on the part taken by American destroyers from one base in April, May and June of this year, which the Associated Press is now permitted to disclose.

These destroyers, which form only a part of America's fleet in European waters, escorted 121 troopship convoys, consisting of 773 ships, in that period. At the same time they escorted 171 merchant convoys, consisting of 1763 ships.

When it is considered that the American Navy in that period did only 27 per cent of the convoying and that the figures represent only the work of destroyers at one base, it may be seen what a tremendous task the allied navies are performing.

There are at present 155 ships flying the British flag carrying American troops exclusively.

In August more than 250,000 American troops arrived in Europe. Of this number the American Navy convoyed 34 per cent, the British 65 per cent and the French 1 per cent.

An average of 2000 personal letters daily are now arriving at the United States Naval Headquarters in London. Ninety per cent of these letters have to be readdressed.

It is understood that American naval aviators have begun seaplane operations from bases on the Irish coast.—*N. Y. Herald*, 5/9.

GERMANS, VIOLATING PLEDGE, SINK BELGIAN RELIEF SHIP.—The Commission for Relief in Belgium issues the following:

On August 15, the *Gasconier*, one of the Belgium Relief Commission ships, while en route to Belgium with a cargo of food, was attacked by a German submarine off Haugusemb in Norwegian territorial waters, entirely outside of the war zone, and was sunk. After the ship was sunk, the submarine fired on the lifeboats, killing the first officer and five men, and wounding several others of the crew.

The Belgium relief ships operate under an undertaking given by the German Government that they shall be immune from attack so long as they are not in the war zone. This special act of piracy has features of hideousness even greater than ordinary submarine work.

A shipload of food to a starving people, proceeding under guaranties from the German Government, is sunk in neutral waters and even after that the crew is murdered.—*Official Bulletin*, 28/8.

BRITISH DESTROYER LOST.—On the 24th of July a British destroyer ran ashore and subsequently sank, 13 of the crew being drowned.—*The Engineer*, 2/8.

WORK OF NAVAL AIRMEN.—The Admiralty announces that a large amount of work has been done by Royal Air Force contingents working with the navy during the period August 1 to 7.

On August 5—as previously reported—our aircraft successfully attacked hostile Zeppelins, one of which was destroyed and another damaged. On another occasion a formation of our large seaplanes in the North Sea sighted a Zeppelin at about 4000 feet. They climbed to attack, and were apparently not at first seen by the enemy. Later the crew of the Zeppelin evidently sighted our machines, for all bombs were dropped, water ballast released, and the nose of the Zeppelin put up into practically a vertical position. By these tactics the Zeppelin was able to escape into the heavy clouds and was lost to sight. One of our machines was forced to land in Dutch waters. The machine was destroyed and the crew interned. Convoy and anti-submarine patrols have been maintained. Enemy destroyers and submarines have been attacked and direct hits registered. Bad visibility has interfered with bombing operations over Ostend and Zeebrugge, but many tons of explosives have been dropped with good results. During engagements that have taken place three enemy machines have been shot down in flames and six driven down out of control. All our machines have returned safely.—*Army and Navy Gazette*, 17/8.

OPERATION OFF JUTLAND.—A detachment of the Grand Fleet, operating off the Jutland coast on the morning of July 19, has now returned to the base, having carried out a bombing attack on the Zeppelin sheds at Tondern, Schleswig, by Royal Air Force machines despatched from the vessels. In the first flight, which was made in the early morning, all machines reached their objective and made direct hits on a large double shed, which was completely destroyed, the conflagration rising to 1000 feet. The second flight followed the first, all machines but one reaching their objective. A large shed was observed to have a hole of considerable dimensions in the roof, from which a volume of smoke was being emitted. A second shed was bombed and direct hits were made, but owing to fierce anti-aircraft fire and to the smoke of the first shed, it was not possible to observe whether destruction of the second shed was complete. The attacks were made from a height of 700 feet to 1000 feet. Four of our machines failed to return, and information has been received that three of these machines landed in Danish territory. All ships returned without any casualties.—*Army and Navy Gazette*, 28/9.

DESTROYERS SUNK.—On August 2 two of His Majesty's torpedo-boat destroyers were sunk by enemy mines with the loss of 5 officers and 92 ratings.—*Army and Navy Gazette*, 10/8.

THE ADMIRALTY has made the following announcements:

Five enemy airships attempted to cross our coasts last night (August), but while still at sea were attacked by Royal Air Force contingents working with the navy. Three were brought to action, one of which was shot down in flames 40 miles from the coast, and another was damaged, but probably succeeded in reaching its base.—*Army and Navy Gazette*, 18/8.

GOTHA NEST ATTACKED.—*Destroyer Hit by Naval Airmen.*—During the period August 8 to 15, Royal Air Force contingents, working with the navy, have carried out a large number of bombing raids on military objectives with good results.

In all approximately 60 tons of bombs have been dropped on Zeebrugge, Ostend Docks, Varssenaere aerodrome, La Brugoise Works, Bruges Docks, Blankenberghe, and Middelkerke, as well as on many enemy batteries and billets.

As a result of the attack on Varssenaere aerodrome, six machines lined up were set on fire, and a fire started amongst hangars on both sides of aerodrome. Two Gotha hangars were hit and one demolished. Large petrol dumps also were set on fire. Fires were observed to be still burning three hours later.

On the 11th, as previously reported, a German airship was sighted in the North Sea and attacked by one of our machines. After a short engagement the enemy airship fell in flames from a great height.

Enemy shipping has also been successfully attacked, and a direct hit was observed on a hostile destroyer, after which other vessels closed round damaged ship. On the return journey, when about eight miles from the scene, a big explosion was seen to occur.

During engagements that have taken place, 16 enemy machines and one captive balloon were destroyed, and 15 machines driven down out of control. Three of our machines failed to return.

In home waters during the same period continuous anti-submarine, convoy, and hostile aircraft patrols have been maintained by seaplanes, aeroplanes, and airships. Submarines have been sighted and attacked, and mines located and destroyed. All our machines have returned.—*London Times*, 17/8.

GERMAN DESTROYER MINED.—The Secretary of the Admiralty made the following announcement on Saturday:

Reconnaissance carried out yesterday, August 9, by Royal Air Force contingents working under the navy observed a German destroyer sunk eight miles northwest of Zeebrugge. This destroyer was in all probability sunk by a British mine.

Enemy mine-sweepers operating yesterday off Zeebrugge were heavily bombed by British aircraft.—*London Times*, 12/8.

THERE WAS A FIGHT on August 11 between British naval light forces and aircraft, reconnoitering the West Frisian coast, and German aircraft. A German airship was brought down in flames, falling into the sea from a great height. Six British motor-boats failed to return.—*London Times*, 13/8.

THE FIGHT OFF THE DUTCH COAST.—*German Account of Losses.*—A Berlin official Admiralty telegram says:

On August 11, in the forenoon, our reconnoitering aeroplanes stationed off the Frisian Isles and an airship sighted strong British naval forces off Vlieland, composed of at least 25 ships of the line, armored cruisers, numerous destroyers, and a torpedo-boat flotilla. With them were six fast boats, which apparently had orders to lay mines on a big scale, in co-operation with the torpedo-boats.

Our aeroplanes and airship immediately attacked with bombs and machine-guns the fast boats and torpedo-boats. They succeeded in destroying three of the fast boats and disabling the remainder of them. Moreover, bomb hits were made on one armored cruiser and one torepdo-boat. The latter was badly damaged and was last seen in a sinking condition.

Our sea forces immediately proceeded to the place of the encounter, but were unable to force the already retreating enemy to accept battle. We lost one airship (Commander Proells) and one aeroplane. In the course of the defence and attack the Borkum and Norderney battle squadrons, under the command of Lieutenants Prendenberg and Hammer, especially distinguished themselves.—*Reuter.*

Note.—With reference to the above, the Secretary of the Admiralty states that our losses have been correctly stated, and that no ship was hit or damaged in any way whatever.—*London Times*, 14/8.

DESTROYERS LOST.—The Secretary of the Admiralty makes the following announcement:

"Two of H. M. destroyers struck mines and sank on the 15th inst. Twenty-six men are missing—presumed killed by explosion or drowned. One man died from wounds. The next of kin have been informed.

The Hague, August 16.—A Dutch fisherman has reported to the port authorities that yesterday he observed two British destroyers sink.—*Reuter.*

Amsterdam, August 17, 7 p. m.—The skipper of a Scheveningen lugger, interviewed by the Hague correspondent of the *Telegraaf*, said:

"As the destroyers were approaching us one of them suddenly split in two and sank in 10 minutes."—*Reuter, London Times*, 19/8.

SINKS WITH SHIP; STUNNED BY BOMB; HERE TO TELL TALE.—Among the passengers who arrived on board an American transport yesterday at an Atlantic port from England were Walter Ramon Herron and seven others of the 31 survivors of the American steamship *Lake Edon*, sunk by a German submarine in the Bristol Channel August 21, with the loss of 17 lives.—*N. Y. Herald*, 7/9.

U-BOAT SUNK BY YACHT.—Details of the sinking of a U-Boat by an armed yacht in the English Channel are now available. Just after sunset the S. O. S. signal was picked up by the yacht, which, diverting several steamers from the danger zone, sighted half an hour later the periscope of a submarine, apparently preparing to attack a merchantman. At full speed the yacht steamed right over the submarine just as the periscope disappeared, a distinct jar suggesting that she had rammed the conning-tower. Two depth charges were then dropped. A few minutes later a third depth charge was dropped in the center of air bubbles, which presently died away. One survivor, covered with a thick coating of oil, was picked up. He was suffering from serious internal injuries, and died three hours later.

In recommending the captain of the yacht for official recognition, his superior officer points out that "his attack was marked by quick decision, good seamanship, and sound judgment."—*London Times*, 9/8.

PRIZE MONEY.—The *London Gazette* of August 16 contained the Royal Proclamation relating to the grant of prize money to the Fleet, and giving effect to the Naval Prize Act, 1918. It is directed that "the net produce of all such prizes captured during the present war as shall be declared by the tribunal appointed under the said Act to be Droits of the Crown, and of all other sums which under that Act shall be paid into the Naval Prize Fund, shall be for the entire benefit and encouragement of the officers and men of our Naval and Marine Forces as defined in the above-mentioned Act, and shall be distributable in accordance with the same Act." It is further ordered that when there is a sufficient sum standing to the credit of the Naval Prize Fund to warrant it, a distribution shall be made in the shares and proportions made in accordance with regulations to be announced to such members of the Naval and Marine Forces as may be qualified to share therein or, in case of their death, to their representatives.

BRITISH SUBMARINE TORPEDOES U-BOAT; ONLY ONE SURVIVOR.—Recently a British and a German submarine met. The enemy had crossed the North Sea, penetrated British waters and was lurking to pounce upon any ship that might cross its track. The British boat was returning to its base after an arduous cruise.

Both boats were on the surface, but the British boat picked up the enemy and dived before she herself was sighted. She fired two torpedoes, and through her periscope the resulting explosion was observed. Coming to the surface five minutes later the British crew found one survivor swimming among the wreckage. He was the captain of the German submarine. The other officers and the crew all had gone down with their boat.—*New York Herald*, 22/8.

AMERICAN NAVAL AVIATORS BOMB SUBMARINE DOCKS IN A NIGHT ATTACK ON GERMAN BASE AT OSTEND.—The Navy Department has received a report from Admiral Sims that American naval aviators conducted a successful bombing expedition at night into enemy territory and dropped a large quantity of explosives on the submarine docks at Ostend.—*Official Bulletin*, 23/8.

BRUGES U-BOAT BASE IS SET ON FIRE BY BRITISH BOMBERS.—"Between August 19 and August 25," says an official statement issued to-day by the British Admiralty, "the air force with the navy bombed the Bruges docks, the Bruges and Zeebrugge mole, the Zeebrugge Canal, the Ostend docks, St. Pierre Capelle, the Solway works and the towns of Middelkerke, Westende and Maria Aalter. We also dropped bombs on German aerdromes at Costacker, Ghistelles, Mariakerke and Vlisseghem.

"Approximately 27 tons of bombs were dropped. At Bruges many good bursts were observed, direct hits being made on the submarine station. Bursts were also observed on the store-sheds on both sides of the west basin."—*New York Herald*, 28/8.

ZEEBRUGGE BOMBED AGAIN.—*British Airmen Also Attack Bruges Docks; Down 12 Germans.*—The official statement on aerial operations issued to-night says:

The weather was cloudy on August 30, but the various activities of our air service were fully maintained all along the front. There was much useful observation by airplanes and balloons. Twelve enemy machines were destroyed during the day and five driven down out of control. Four of our machines are missing.

The Bruges docks and the Zeebrugge mole were heavily bombed, as well as a number of selected targets opposite the battle zone. In all, 25½ tons of bombs were dropped during the 24 hours.—*New York Herald*, 1/9.

U-BOAT SHELTERS ARE BOMBED BY BRITISH AVIATORS.—British naval air forces between September 1 and September 7 made four attacks on German submarine shelters and workshops on the docks at Bruges, Belgium, according to an official statement by the British Admiralty. Several hits were obtained.

The Ostend docks and motor boat depot at Blankenberge also were attacked with good results.

The text of the statement reads:—

"The operations by royal air force contingents working with the navy during the period from the 1st to the 7th of September have been considerably hampered by unsuitable weather conditions.

"Submarine shelters and workshops at the Bruges docks have been attacked on four occasions, direct hits being obtained. The Ostend docks and coastal motor boat depot at Blankenberge were also attacked with good results and a large fire was started.

"Enemy mine sweepers also were harassed with bombs and machine gun fire. More than 14 tons of bombs were dropped by day bombing squadrons, one machine failing to return.

"In engagements with hostile aircraft 10 machines have been brought down and nine driven down out of control. Three of our machines are missing.

"In home waters anti-submarine and convoy patrols have been maintained. Submarines have been sighted and attacked and enemy mines have been located and destroyed."

Another communication dealing with the operations on Monday, says:—

"Low clouds and rain squalls made the weather most unsuitable for flying. Our artillery machines persisted in their work whenever an opportunity offered.

"There is nothing else of interest to report. Flying was impossible at night."—*New York Herald*, 11/9.

MINES DESTROY HUN WARSHIPS.—Unidentified German warships were mined and sunk off the coast of Holland September 5, according to advices here to-night.—*Washington Post*, 8/9.

BALTIC AND SKAGERRACK

HEAVY GUN-FIRE OFF THE SKAW.—Copenhagen, August 13.—It is reported that yesterday afternoon gun-fire was heard at the Skaw of a heavier character than on any previous occasion. Several large warships were observed passing at high speed.—*London Times*, 19/8.

MEDITERRANEAN

FRENCH LINERS SUNK.—It is officially announced that the Messageries Maritimes steamer *Djemnah*, with military passengers, in an escorted convoy, was torpedoed by a submarine on the night of July 14-15 and sunk. Of those on board 442 are missing.

On July 19, also in the Mediterranean, the *Australien*, belonging to the same company, was torpedoed, set on fire, and foundered. Seventeen of the crew were killed. Nine hundred and forty-eight passengers were saved. Three passengers are missing. Another ship in the same convoy as the *Australien* was torpedoed, but was prevented from sinking. Numerous depth charges were dropped on the submerged submarine.—*Reuter*.

The *Djemnah* was an iron vessel of 3716 tons, built in 1875. The *Australien* was a more modern boat, built in 1889 of steel, and had a tonnage of 6377.—*London Times*, 19/8

U-BOAT OFFICER WHO SANK THE "LUSITANIA" REPORTED CAPTURED.—*German U-Boat Is Sunk After Attack on Ship.*—The British passenger steamship *Bandy*, while on a voyage between Malta and Sicily, was torpedoed by a German submarine and, although the explosion tore a gaping wound in her starboard side, the vessel succeeded in reaching the harbor here to-day.

The U-boat which fired the torpedo was attacked by patrol boats escorting the *Bandy* and was sunk. Six of the submarine's crew, numbering 65 officers and men, were saved, including the first mate.

The admirable conduct of the crew of the *Bandy* was responsible for the safety of all the passengers. Two men were wounded when the torpedo exploded.

The mate of the submarine when hoisted aboard a destroyer attempted to commit suicide. He appeared to be insane and made wandering statements about the loss of his submarine. He said the lost U-boat had torpedoed the Cunard liner *Lusitania* and had destroyed an aggregate of 600,000 tons of other allied shipping.

Available shipping registers do not list the British steamship *Bandy*, and she probably is a new vessel. Advices from London on August 10 said that Lieut. Commander Schwieger, who commanded the submarine which sank the *Lusitania*, had been killed when the U-boat of which he was in command struck a mine in the North Sea.—*Evening Star*, 24/8.

BRITISH DESTROYER LOST.—The Secretary of the Admiralty makes the following announcement:

One of H. M. destroyers, which had been seriously damaged by collision, was torpedoed and sunk by enemy submarine in the Mediterranean on the 6th instant.

Two officers and five men lost their lives owing to the collision. The next-of-kin have been informed.—*London Times*, 9/8.

SPANISH STEAMER SUNK.—According to news from Athens, a Spanish steamer, flying the Spanish flag and having on board the Spanish Minister to Greece Señor Lopez de Vega, has been torpedoed by an enemy submarine. The Minister was rescued.—*Army & Navy Gazette*.

MINE AND TORPEDO GET FRENCH CRAFT.—Official announcement is made that the French mail steamship *Polynesian*, bound from Bizerta to Saloniki, was sunk by a mine the morning of August 10. Six Serbian passengers, 11 Indian firemen and two sailors are missing.

It is also announced officially that the French steamship *Balkan*, on her way from France to the island of Corsica, was torpedoed and sunk the night of August 15. One hundred and two persons are known to have been saved.

The *Polynesian* was of 6373 tons. She was built in 1891 and was owned by the Messageries Maritimes, of Marseilles.

The *Balkan* was of 1709 tons. She was built in 1882 and was owned in Marseilles.—*N. Y. Herald*, 22/8.

MIGHTY U-BOAT SUNK BY LOWLY TRAWLER.—The exploit of a French trawler, the *Automne*, which succeeded in destroying a submarine that was attacking a British steamship in the Mediterranean, is described in a dispatch to the *Matin* from Toulon.

The trawler was patrolling the Mediterranean when it received a wireless call from the British vessel, which was being attacked 30 miles off Marseilles. Although the submarine had submerged, the *Automne* traced it and succeeded in destroying it with depth bombs. The British steamship returned safely to Marseilles.—*N. Y. Herald*, 12/9.

ONLY 4 OF 359 MEN LOST ON SHIP SUNK.—The French steamship *Pampa*, of 4471 tons, was sunk by a torpedo on the night of August 26-27 while on a voyage from Bizerta to Saloniki. Four Serbian soldiers, out of the 359 persons on board, are missing.—*N. Y. Herald*, 4/9.

ADRIATIC

AIR RAIDS.—The Italian Naval General Staff has issued the following announcements:

Our seaplanes raided Durazzo on June 25 when a large steamer was hit and fires broke out near some sheds. There was lively anti-aircraft fire, but all our machines returned. On June 24 Durazzo was again raided with successful results. British machines on a reconnoitering flight over Cattaro engaged enemy machines and hit one, which was seen to fall out out of control. All the British and Italian machines returned.

Italian seaplanes on July 18 bombarded the military works at Antivari and the vessels moored there. Serious material damage was observed. All the machines returned. The British Air Service has also effectively contributed in the Adriatic in attacks on enemy naval bases. On July 17 British machines bombarded military works at Cattaro. All the British airmen returned.—*Army and Navy Gazette*, 27/7.

The Chief of the Italian Naval Staff announces that on July 22 and 23 Italian seaplanes proceeded to Durazzo and dropped bombs upon steamers moored in the port and upon sheds there. A steamer was damaged and several depots were struck and fires were observed. All machines engaged in these two actions returned undamaged to their base. On August 1 our Naval Air Service bombarded the military and harbor works of Pola. Several fires were observed in the neighborhood of submarine and aviation stations. All our machines returned uninjured.—*Army and Navy Gazette*, 10/8.

The Chief of the Italian Naval Staff announces that on July 21 military works and the anchorages at Cattaro and Antivari were bombed with good results. Two enemy machines detected on July 18 above Ancona were both brought down by seaplanes.—*Army and Navy Gazette*, 3/8.

AUSTRIAN SHIP TORPEDOED.—An Italian Naval *communiqué* reports that in the Upper Adriatic submarine *F-7*, after crossing certain mined areas, boldly entered the Gulf of Quarnerolo, and seeing near the island of Pago a large Austrian steamer going south, the *F-7* succeeded in hitting

the vessel amidships with a torpedo, which sank her. The submarine returned unharmed to her base.

Lieutenant-Commander Mario Falangola, the commander of the *F-7*, sank last February another large enemy vessel near the island of Lussin, in the Adriatic.—*London Times*, 21/8.

AMERICAN AIR STATION IN ITALY ATTACKED BY HUNS.—News has been received here to the effect that one of the American naval air stations in Italy was recently attacked by a large force of enemy airplanes, which dropped more than a dozen heavy bombs, none of which did any damage to the station. American airplanes and anti-aircraft guns beat off the enemy machines.—*New York Herald*, 21/8.

TURKISH WATERS AND BLACK SEA

OFFICERS AND MEN OF INTERNED UNITED STATES SHIP REPORTED WELL CARED FOR IN TURKEY.—The Committee on Public Information issues the following:

The Navy Department announces that information has been received from the Royal Swedish Legation at Constantinople, Turkey, that the officers and enlisted men of the U. S. S. *Scorpion*, interned there since April 11, 1917, are in good health, and that the food supply is wholesome and abundant.

Ship at New Anchorage.—The report states that the *Scorpion* has been moved to a new anchorage that is a healthier and more agreeable location than the former mooring; there are numerous books aboard the ship, the Constantinople newspapers are available, and the crew is allowed to play football on the drill grounds of the ministry of marine.

Officers and men are all said to be in excellent health, there being no cases of sickness on board at the time the report was made. Every week two officers and seven members of the enlisted personnel are allowed to visit the city under escort. In addition to this, several of the men have been permitted to go into the city to receive dental treatment. Steps are being taken, the report states, to get even more liberal permissions for shore liberty. The men appear contented, their chief requests being for more news from home and more shore leave.—*Official Bulletin*, 28/8.

MORE AMERICAN TROOPS LANDED AT VLADIVOSTOK.—A second transport carrying American troops arrived at Vladivostok to-day. The transport bearing the first contingent of American soldiers, entered the harbor yesterday afternoon after a voyage of seven and a half days from Manila. A third troopship is expected to arrive this evening.

General Dieterichs, the commander of the Czecho-Slovak forces, in pointing out to-day the great odds his troops are facing, estimated the enemy strength at 40,000 men, with 70 guns and 200 machine guns. The status of the Czecho-Slovaks in Transbaikalia is unknown, he said, but it certainly must be desperate. To attain the object sought by the Entente allied governments, a substantial force must be sent to the Manchurian front, he asserted.

Dr. Yaromir Spacek, a member of the Czecho-Slovak National Council, has left for Washington to acquaint Professor T. G. Masaryk, the president of the Council, with the situation of the Czecho-Slovaks. Dr. Spacek told the correspondent that the Czecho-Slovaks will abide by the decision of Professor Masaryk as to whether they shall proceed to France, which is their ambition, or stay in Russia to fight the enemy, if given adequate support.

Opinion on all sides appears to be that the allied governments are underestimating the magnitude of the task of liberating the Czecho-Slovaks, and do not realize the necessity of actual warfare against superior numbers.

In the absence of artillery, the British have equipped two gondolas with guns from a cruiser and sent them to the Ussuri front.—*New York Herald*, 20/8.

GENERAL

SUBMARINES AND SHIPPING

THE SUBMARINE SITUATION.—The best possible measure of the success of the anti-submarine effort of the Allies is to be found in the diminution of tonnage sunk. Another standard not to be despised, however, is that given by the number of U-boats accounted for. Last week Mr. Lloyd George announced in the House of Commons that at least 150 enemy submarines had been sunk by the British Navy. The qualifying words "at least" were made necessary by the uncertainty which must in so many cases attach to the destruction of a boat capable of underwater navigation. When, therefore, the Prime Minister mentioned 150, it may be assumed that this was a minimum figure, and since he added that this was the bag of the British Navy it is obvious that it was by no means an underestimation of German loss. The Allied Navies—American, French, Italian and Japanese—have all some successes to their credit, and assuredly it could not be taking too sanguine a view to put their aggregate haul at another 50. In all probability, then, about half of the total number of boats which Germany has built have been accounted for.

There have been several estimates made of the number of submarines which Germany has possessed for the purpose of carrying out her U-boat campaign. Some of these have been most extravagant, as when it was alleged that the Germans had 700 submarines in the water, with the expectation of having 1200 by the end of 1917. This proposition was altogether discredited by engineering experts. The *Times* on Saturday last calculated that the number of boats produced by Germany worked out at something like 360, and this figure is believed to be approximately correct. An official return made just before the war broke out credited Germany with 28 boats, and up to the end of 1915 they were thought to have produced about 50 more. Since that date the production is assumed to have varied from 8 to 12 a month, or for two years, 1916 and 1917, about 220. Another 50 or 60 for the first half of this year gives the total mentioned in the *Times*. There was, however, a German statement which from its source cannot be entirely discredited. Mr. Karl von Wiegand had as good opportunities as anyone for knowing what was being done in Germany, and he said that at the end of May, 1917, they had 184 boats in commission, with five waiting for crews, and 15 in the training service, altogether 204 boats. This was the number, it must be remembered, claimed apart from the losses during the 34 months from August, 1914, to May, 1917. The American journalist also said that they were turning out from 10 to 12 a month, adding that by the end of August, 1917, they would have a total of 235 underwater craft. If this rate of production had been continued during the past 12 months without any losses, the Germans would possess 355 boats, but Mr. Lloyd George said that half of the total number of boats destroyed by the British Navy had been sunk last year. From the 355, therefore, at least 75 must be deducted, leaving a balance of 280, or, if 50 more are taken off as sunk by the Allies, somewhere about 200. This is approximately the figure arrived at in the *Times'* estimate. Even, however, if Germany has 200 boats left, a certain proportion of these will be under repair, employed for training purposes, or otherwise not actually available for service. The active campaign has probably been carried out by less than 100 boats.—*Army and Navy Gazette.*

SHIP LOSSES AND REPLACEMENT.—The official returns recently issued on ship losses and new merchant ship construction show an improvement as compared with the situation at the close of the first quarter of the present year. The losses of British ships during the second quarter amounted to 614,818 tons, whilst our output of new ships forms a total of 442,966 tons for the same period. The situation is illustrated by the diagram Fig. 1. The other diagram, Fig. 2, illustrates the world's merchant tonnage losses through enemy action and marine risk, and the world's output, also down

to the second quarter of the present year. The world's output for the quarter ending June last, reached a total of 1,243,274 tons, whilst the world's losses for the same period amount only to 946,578 tons. The output for the world during the last quarter therefore exceeded the losses from all causes by 296,696 gross tons.

The Secretary of the Admiralty this week has issued an announcement, showing the output of merchant tonnage in the United Kingdom and Allied and neutral countries during the years 1915, 1916, 1917, and the quarters ending March 31 and June 30, 1918, as follows:

TABLE I.—*Output of Merchant Tonnage*

Period	United Kingdom	Allied and Neutral	World
1915	650,919	551,081	1,202,000
1916	541,552	1,146,448	1,688,000
1917	1,163,474	1,774,312	2,937,786
1918			
First quarter	320,280	550,037	870,317
Second quarter	442,966	800,308*	1,243,274

* Provisional figures.

In the same returns, the Secretary for the Admiralty published the tonnage of merchant vessels completed in United Kingdom yards and entered for service during July, 1918, compared with preceding periods; he remarks that the information is in an amended form, adding that the return, whilst giving practically all the information contained in the former one, will, in the opinion of the Controller General of Merchant Shipbuilding, enable the public more readily to grasp the position. It will also be adopted in future months. The particulars are contained in the following table:

TABLE II.—*Tonnage of Vessels Completed in United Kingdom Yards and Entered for Service*

1917	Completions gross tons	1918	Completions gross tons
January	48,089	January	58,568
February	79,451	February	100,038
March	118,699	March	161,674
April	69,711	April	111,533
May	69,773	May	197,274
June	109,847	June	134,159
July	83,073	July	141,948
		July 31, 1918	905,194
Total, 7 months, to July 31, 1917	57,643	Total, 7 months, to July 31, 1918	490,025
Total, 12 months, to July 31, 1917	865,147	Total, 12 months, to	

With reference to the information contained in Table II, the Controller General for Merchant Shipbuilding states that the figures for the month of July in any year are not usually very high, owing to the holidays which are taken at this time of the year, and which, having regard to the sustained strain on the men, he did not consider it wise to ask them to forego. Towards the end of June most of the shipyard workers on the English Northeast Coast take their fortnight's holiday; and during July a similar state of affairs exists both on the Clyde and in Belfast. Compared with the month of July in 1916 and 1917, the output for July, 1918, shows an increase of 174 per cent and 71 per cent respectively.

The serious influenza epidemic has had a transient, although marked, effect on the shipbuilding industry. He received several letters from shipbuilders stating that, during the epidemic, from 35 per cent to 50 per cent

of their workmen, draftsmen and clerks have been absent, and although most of the men are now back at work, it will be realized that this has somewhat retarded progress all over the country.

Having regard, however, to all circumstances, he considers the July output as being reasonably satisfactory.

Fig. 1. LOSSES BY ENEMY ACTION AND MARINE RISKS. ALSO SHIPBUILDING OUTPUT OF THE UNITED KINGDOM

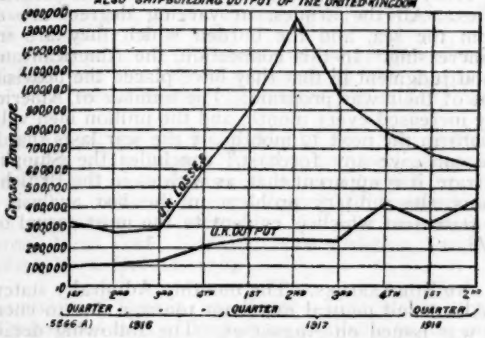
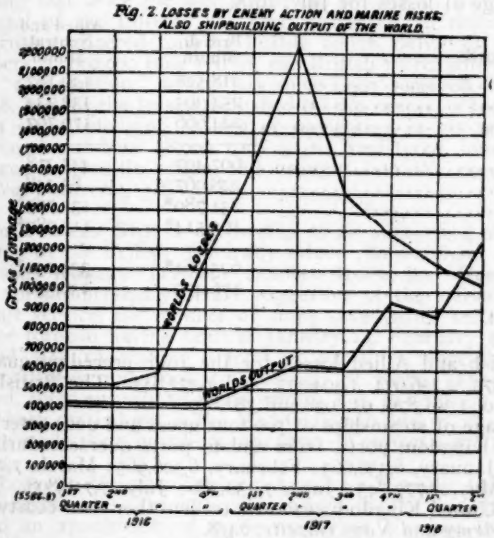


Fig. 2. LOSSES BY ENEMY ACTION AND MARINE RISKS. ALSO SHIPBUILDING OUTPUT OF THE WORLD.



The above figures, satisfactory in themselves, gain much in significance from a statement recently made by Sir Joseph Maclay, Shipbuilding Controller, to the effect that only those who have access to official records can appreciate the character of the enemy's effort to arrest the varied transport movements, and particlularly the transport of the American forces destined for Europe. The enemy has been able, in the words of Sir Joseph, to combine his original purpose and his original plans for attempting to starve out England, with his new plans for attacking the transports. Every submarine at the command of the Germans has been sent to sea, manned

by the most experienced officers and men, but over 1,000,000 troops, with stores complete, have been carried across the Atlantic, and the lives of less than 300 soldiers have been lost. On the average, about 60 per cent of the American soldiers have been carried in British ships, and the proportion, Sir Joseph says, is steadily rising.

The fact, nevertheless, remains, he adds, that the importance of speeding up British construction cannot be exaggerated, for the question of tonnage is becoming every day increasingly the predominant problem of the war for the Allies. All the armies, in varying degree, are drawing their strength from the sea, and the burden which they are imposing upon shipping is increasing. In this connection, the American authorities have exhibited good judgment in that they have placed the provision of ships in the forefront of their war program. The number of American soldiers is being rapidly increased every month, and the million men will have become several millions in the next 12 months, if the war lasts that long. "As to that, no one can give any forecast," concludes the Shipping Controller, "but, at any rate, it is apparent that, as with us in the British Isles, so with the Americans, the military problem in the last analysis is a tonnage problem," a statement which is evident to the most casual observer.—*The Engineer*, 9/8.

SHIPPING AND SUBMARINES.—The monthly Admiralty statement of losses of British, Allied and neutral merchant tonnage due to enemy action and marine risk was issued on August 21. The following details include the gross tonnage of losses for July, 1918.

Period, 1918.	British Month	Allied and Neutral Month	Total Month
January	218,528	136,187	354,715
February	254,303	132,234	386,637
March	224,666	176,797	401,463
Quarter	697,497	445,318	1,142,815
April	228,067	85,348	313,415
May	231,780*	132,703*	364,483*
June	165,514*	115,980*	281,494*
Quarter	625,361*	334,031*	959,392*
July	176,479	136,532	313,011

*Adjusted.

The British and Allied losses for the four preceding quarters in 1917 were 1,619373, 2,236,934, 1,494,473, and 1,272,843. The British losses alone were 911,840, 1,361,879, 952,938,and 782,889.

The tonnage of steamships of 500 tons gross and over entering and clearing United Kingdom ports, from and to ports overseas during the period 1918 was: January, 6,336,663; February, 6,326,965; March, 7,295,620; April, 7,040,309; May, 7,777,843; June, 7,430,386; July, 7,718,898. These figures include all United Kingdom seaborne traffic other than coastwise and cross Channel.—*Army and Navy Gazette*, 24/8.

ALL SHIP CONSTRUCTION RECORDS BROKEN.—Breaking all records, the shipyards turned out 340,000 deadweight tons in August, which is 60,000 tons more than the best previous record of 280,000 tons in June. The August figure represents an increase of 114,000 tons over the July production of 226,000 tons.

Shipping officials to-day believed the tonnage situation was daily growing easier. It was pointed out that the great increase in production would release some of the smaller vessels now in trans-Atlantic service for coastwise and inter-American traffic.—*Evening Sun*, 5/9.

SHIPS TURNED OUT IN SEPTEMBER WILL EXCEED ALL RECORDS.—Deliveries of completed vessels for the Shipping Board for September are expected to make another record for ship construction. The total deliveries up to September 13 amounted to 147,250 deadweight tons. The launching for the same period total 150,370 deadweight tons.

Both deliveries and launchings are expected to go over this mark for the latter half of the month.

Of the completed vessels 23, with a deadweight tonnage of 136,520, were steel. Three, with a tonnage of 11,000, were wooden vessels.

Of the vessels launched, 17 were steel, with a tonnage of 111,870, and 11 wood, with a tonnage of 38,500.

An increase of 491 per cent in a month in the number of recruits for the Merchant Marine was the record reported by the Board to-day. The figures cover four weeks ending September 12, and by weeks were as follows:

Week ending August 22, 913 men; August 29, 1779; September 5, 2697; September 12, 4484. The figures for the last week exceed by 484 men the number the Board had announced as an expected maximum for the month of September. The men are accepted for training as sailors, firemen, coal passers, cooks and stewards, and will be put aboard training ships at Boston, New York, Norfolk, New Orleans, San Francisco and Cleveland.—*New York Herald*, 17/9.

GERMAN SUBMARINE REPORT FOR JUNE.—This claims that a total of 521,000 gross registered tons of ship space available to the enemy has been destroyed, and that since the war began the amount of world ship space at the disposal of the Entente has been decreased, in round figures, by 18,251,000 gross registered tons by hostile action only. Of this loss, in round numbers, 11,000,000 tons fell on the British mercantile marine. According to "confirmation," which has since been received, in the month of May, 1918, besides the losses published by the enemy, a further number of merchant ships belonging to him or navigating in his service, aggregating in round numbers 48,000 tons gross registered tons, have been badly damaged by hostile action and brought into the enemy's ports.—*Army and Navy Gazette*, 3/8.

SALVAGE OF SUNKEN SHIPS.—According to an authorized statement, the salvage section of the British Admiralty salved 260 merchant ships, mostly of considerable tonnage, between October, 1915, and December, 1917. The figures for the present year are suggestive of the increased efficiency of the salvage service, the number of ships saved after suffering damage from mine or torpedo having been in January 14, February 41, March 37, April 36, and May 19, making a total of 407 ships since the Admiralty Salvage Department undertook this branch of work. These figures, it may be noted, refer entirely to home waters, but, in addition, a great deal of work has been carried out in the Mediterranean and in other seas where U-boats have made their hostile appearance.—*Nautical Gazette*, 31/8.

NORWAY LOST 13 VESSELS DURING AUGUST.—Norway lost 13 vessels, aggregating 22,976 tons, through war causes in the month of August, according to an announcement made to-day at Norway Legation here. Two Norwegian sailors lost their lives.—*N. Y. Herald*, 7/9.

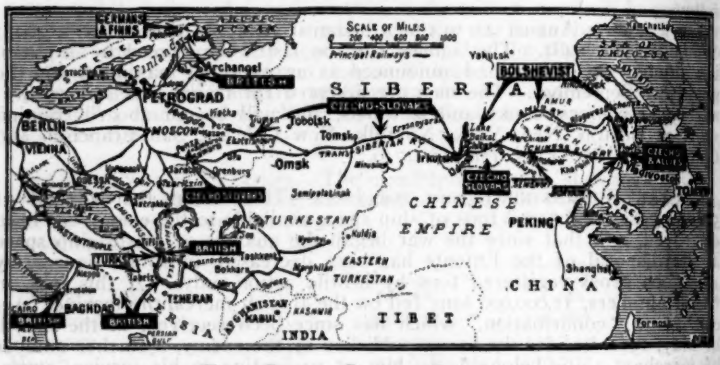
NO MORE VESSELS SAFE UNDER HUN SAFE CONDUCT.—By a decree issued to-day neutral vessels operating under safe conduct issued by an enemy country will not be recognized by the Allies, and both vessel and its cargo are liable to seizure.

The decree stipulates that any neutral vessel which places itself under enemy control by receiving an enemy safe conduct, which is not recognized by the Allies and is in oposition to the exercise of their belligerent rights,

will be considered, unless proof to the contrary is furnished, that it is navigating in enemy interests and therefore be subject to capture and confiscation, together with the merchandise or enemy property constituting the cargo.—*N. Y. Herald,* 29/8.

MILITARY

The Czecho-Slovaks are divided into three separate groups. In European Russia they are fighting along the middle Volga. A second force is spread out along the line of the Siberian Railway from European Russia to Lake Baikal, and is in danger from enemy prisoners and Bolshevists. With the object of aiding this force a British detachment has been sent down the Dvina from Archangel in the hope of getting into



THE CZECHO-SLOVAK CAMPAIGN.

touch with our new Allies in the Ekaterinburg region, in the Urals. The third force is north of Vladivostok, where Japanese, British, and French detachments have joined it in the Ussuri province. This force has been driven back by the Bolshevists. Our map also indicates the new campaigning theaters in Persia and on the Murman coast.—*London Times,* 17/8.

FOUR HUGE LINES OF DEFENCE REFUGE FOR HUN RETREAT.—The rapidity of the splendid operation that wrested the initiative drive of the battle from the Germans and drove them behind their defensive lines of 1917 to recuperate their forces and reconstitute their shattered divisions, is no longer the proper basis for calculating the speed of progress. The Allies now are in front of obstacles that do not appear on ordinary maps by which the general reader follows changes of the battle front. No maps show them in all their details, but enough is known of them to reconstitute them in a general way.

First is the Hindenberg line system of field fortifications which the Germans built by the forced labor of prisoners of war and French and Belgian civilians. It runs from Lens southeastward to the Aisne, north of Rheims by way of Queant, St. Quentin, La Fere and the St. Gobian forest. It consists of an elaborate system of trenches, multiple lines of barbed wire entanglements, concrete positions for artillery, blockhouses for machine guns, shelters for the infantry, and is further protected by flooded stretches of country where the means were available for that purpose.

Runs to Stronghold of Metz.—The second line of defence runs from the fortress of Lille to the stronghold of Metz, generally parallel with the Hindenburg line, to the region north of Rheims and at distances varying

from seven to 20 miles. From Soissons north of Rheims it runs southeastward, joining the old front north of Verdun and continuing from there to Pagny on the Moselle River south of Metz.

There are secondary lines attached to this system, notably along the Escant River from Cambrai north between the valleys of the Oise and the Serre and northeastward from La Fere along the Suippe River north of Rheims.

A third line of defence runs from the Scarpe River, south of Lille, to the Meuse, near Sedan, then southeastward to the iron region of the basin of Bricy, which it protects from the west and the south, and joining the second line at the Moselle. There are secondary defence works to this line also in the region of Vervins.

A fourth line, as yet uncompleted, is intended to furnish a further defence between the Escant, near the Belgian frontier and the Meuse at Givet.

Each Line a Strong Refuge.—Each one of these lines furnishes a strong refuge for armies obliged to retire upon it. The lines also offer to forces dwindling in numbers the advantage of progressively shortening the battle front.

The first of the lines already has been broken between Queant and Drecourt. The development of this success may determine the question whether the Germans can oblige the Allies to revert to trench warfare. The enemy second line of defence almost touches the Hindenburg line at Cambrai, just below the breach the British forces have made in it. If they are able to join the two lines there, the Germans will still have an uninterrupted defensive position in which the second line enters for only the distance from Lille to Cambrai, being continued to the Chemin-des-Dames by the Hindenburg line.—*New York Herald,* 16/9.

FRENCH DROP 629 TONS OF BOMBS IN AUGUST.—During the month of August French bombardment airplanes dropped more than 629 tons of projectiles, according to a statement issued to-day by the war office. The statement says:

"In the course of August our bombardment airplanes in day flights dropped more than 200 tons of projectiles on objectives on the battlefield between the Somme and the Aisne. In night attacks our bombing airplanes dropped 360 tons of projectiles on railway stations and enemy roads of communication.

"In the same month 280 enemy machines were downed or seen falling out of control, and 66 enemy balloons were set on fire."—*Evening Star,* 11/9.

AERIAL ACTIVITY OF LATE.—The longer the world war contiues the greater becomes the conflict on the ground and in the air. In the latter sphere the activity has attained unbelievable proportions, as witness the recent British official statement reporting over 120 German machines shot down in two days' fighting. The average wastage daily in aerial fighting is as great to-day as the wastage of a month in the early days of the war. This bit of information offers interesting opportunities to speculate on the production of German aircraft, which by now must be tremendous in order to keep pace with the constant and heavy drain. Indeed, it is an augury of what we should be able to do when our aircraft production facilities are once straightened out and under full headway.—*Scientific American,* 24/8.

NINETY-SIX RAIDS INTO GERMANY.—*July a "Record" Month.*—During the month of July no fewer than 100 raids were carried out by the Independent Force, Royal Air Force, of which 96 were into Germany itself. In all, 81 tons of bombs were dropped upon important military objectives during these raids. Notwithstanding the frequent periods of bad weather,

the month's work constitutes a "record," both as regards the number of raids undertaken and the weight of bombs dropped. The previous best month was June last, when 74 raids were made into German territory and 61¼ tons of bombs dropped.

The following is a list showing the towns raided, and the number of separate occasions upon which each place was raided. The list covers only the work of the R. A. F., Independent Force, apart altogether from the immense weight of bombs dropped by Royal Air Force airmen throughout the Western Front, and upon such coastal objectives as Ostend, Zeebrugge, Bruges, etc.; or the formidable work of the French Air Service:

Baden	1	Marville	1
Balan (Sedan)	1	Metz Sablon	5
Boulay	13	Morhange	6
Brulange	1	Oberndorf	2
Bühl	3	Offenburg	7
Burbach	3	Pforzheim	1
Coblentz	3	Rostatt	1
Courcelles	1	Remilly	4
Dieuze	1	Rottweil	1
Falkenburg	1	St. Avold	1
Freisdorf	5	Saarbrücken	3
Hagenau	1	Saarburg	2
Hagondange	1	Sollingen	1
Han	1	Speyer	1
Heidelberg	1	Stuttgart	2
Kaiserslautern	2	Thionville	5
Karthaus	2	Trèves	2
Lahr	2	Vahl Ebersing	1
Lumes	2	Vergaville	1
Luxemburg	1	Wadgassen	1
Malmy	1	Zweibrücken	1
Mannheim	4		

—*London Times*, 15/8.

AMERICAN BLUEJACKETS HELP WIN IN RUSSIA.—A detachment of American bluejackets was among the Entente allied forces fighting recently in the vicinity of Oberserskaya, which resulted in the capture of the town. The Americans successfully extricated themselves from a dangerous predicament when surrounded by the enemy.

The Americans were a part of the expedition which approached the town from the rear some time in advance of other forces moving in another direction. Completely surrounded, the Americans fought their way through, but found themselves imbedded in deep swamps, through which they struggled for more than two days.—*Washington Evening Star*, 16/9.

ENEMY WIRELESS STATIONS IN OUR MIDST.—Two secret wireless stations, one a powerful affair for sending located on a large office building inside the Chicago loop district, were recently raided by operatives from the Department of Justice. The second was equipped for receiving only and was on the north side. Investigation has revealed that the "sending" station was powerful enough to transmit messages to Mexico. One man connected with the work, when taken into custody, was found to be registered as an alien enemy. Two wireless operators were attached to the sending station when government men raided the office installed on top of the downtown office block. They admitted they had been sending messages for some time, but declared they had no idea where they were sending them. They insisted they had merely been employed to send and they knew nothing more than this about the affair. They had a knowledge that the stuff they were handling had something to do with Great Lakes, they said. The sending station, continues *The Wireless Age*,

was rigged up with wires which ran out on to the roof of the sky-scraper and were attached to the metal frame of the building to make the necessary "ground." The receiving station was cleverly concealed in a room on the upper floor of a flat building. Several hundred feet of wire had been rigged up in the room, running back and forth to make the aerial.—*Scientific American*, 31/8.

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UNITED STATES VESSELS

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Montauk (mine sweeper)....2462
Lake Edon (cargo transport) 2462
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BRITISH VESSELS

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Persic (transport) 2465
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2 destroyers 2468
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BRITISH VESSELS—*Cont'd*

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1 destroyer 2472

FRENCH VESSELS

Dupetit Thouars (cruiser)...2455

GERMAN VESSELS

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1 submarine 2463
1 destroyer 2469
1 submarine 2470
1 submarine 2470
1 submarine 2472
1 submarine 2473

DIPLOMATIC NOTES

FROM AUGUST 20 TO SEPTEMBER 20

PREPARED BY

ALLAN WESTCOTT, PH. D., Instructor, U. S. Naval Academy.

ENEMY EAGER TO SAVE SPOILS BY PEACE

AUSTRIA'S BID FOR NEGOTIATIONS.—On September 15 the Austrian Government made public a Note sent to all warring powers proposing a preliminary, non-binding conference in a neutral country on the basic principles of peace. The Note argued that the professed aims of both belligerent parties were similar and that further struggle would be futile.

The introductory communication, while at times obscure in the present translation, and characteristically vague and involved in statement, argues that a more conciliatory atmosphere has been created by previous overtures.

The preliminary communication and the Note itself follow:

The Communication.—An objective and conscientious examination of the situation of all the belligerent States no longer leaves doubt that all peoples, on whatever side they may be fighting, long for a speedy end to the bloody struggle. Despite this natural and comprehensible desire for peace, it has not so far been possible to create those preliminary conditions calculated to bring the peace efforts nearer to realization and bridge the gap which at present still separates the belligerents from one another.

A more effective means must therefore be considered whereby the responsible factors of all the countries can be offered an opportunity to investigate the present possibilities of an understanding.

The first step which Austria-Hungary, in accord with her allies, undertook on December 22, 1916, for the bringing about of peace did not lead to the end hoped for.

The grounds for this lay assuredly in the situation at that time. In order to maintain in their peoples the war spirit, which was steadily declining, the allied Governments had by the most severe means suppressed even any discussion of the peace idea. And so it came about that the ground for a peace understanding was not properly prepared. The natural transition from the wildest war agitation to a condition of conciliation was lacking.

It would, however, be wrong to believe that the peace step we then took was entirely without result. Its fruits consist of something which is not to be overloked—that the peace question has not since vanished from the order of the day. The discussions which have been carried on before the tribunal of public opinion have disclosed proof of the not slight differences which today still separate the warring powers in their conception of peace conditions.

Nevertheless an atmosphere has been created which no longer excludes the discussion of the peace problem.

Without optimism, it at least assuredly may be deduced from the utterances of responsible statesmen that the desire to reach an understanding and not to decide the war exclusively by force of arms is also gradually beginning to penetrate into allied States, save for some exceptions in the case of blinded war agitators, which are certainly not to be estimated lightly.

The Austro-Hungarian Government is aware that after the deep-reaching convulsions which have been caused in the life of the peoples by the devastating effects of the world war it will not be possible to re-establish order in the tottering world at a single stroke. The path that leads to the restoration of peaceful relations between the peoples is cut by hatred and embitterment. It is toilsome and wearisome, yet it is our duty to tread this path—the path of negotiation—and if there are still such responsible factors as desire to overcome the opponent by military means and to force the will to victory upon him, there can, nevertheless, no longer be doubt that this aim, even assuming that it is attainable, would first necessitate a further sanguinary and protracted struggle.

But even a later victorious peace will no longer be able to make good the consequences of such a policy—consequences which will be fatal to all the States and peoples of Europe. The only peace which could righteously adjust the still divergent conceptions of the opponents would be a peace desired by all the peoples. With this consciousness, and in its unswerving endeavor to work in the interests of peace, the Austro-Hungarian Government now again comes forward with a suggestion with the object of bringing about a direct discussion between the enemy powers.

The earnest will to peace of wide classes of the population of all the States who are jointly suffering through the war—the indisputable rapprochement in individual controversial questions—as well as the more conciliatory atmosphere that is general, seem to the Austro-Hungarian Government to give a certain guarantee that a fresh step in the interests of peace, which also takes account of past experiences in this domain, might at the present moment offer the possibility of success.

The Austro-Hungarian Government has therefore resolved to point out to all the belligerents, friend and foe, a path considered practicable by it, and to propose to them jointly to examine in a free exchange of views whether those prerequisites exist which would make the speedy inauguration of peace negotiations appear promising. To this end the Austro-Hungarian Government has today invited the Governments of all the belligerent States to a confidential and unbinding discussion at a neutral meeting place, and has addressed to them a note drawn up in this sense.

This step has been brought to the knowledge of the Holy See in a special note, and an appeal thereby made to the Pope's interest in peace. Furthermore, the governments of the neutral States have been acquainted with the step taken.

The constant close accord which exists between the four allied powers warrants the assumption that the allies of Austro-Hungary, to whom the proposal is being sent in the same manner, share the views developed in the note.

[The official telegram proceeds to say that the note has been drawn up in French, and runs as follows:]

Text of the Note.—The peace offer which the Powers of the Quadruple Alliance addressed to their opponents on December 12, 1916, and the conciliatory basic ideas of which they have never given up, signifies, despite the rejection which it experienced, an important stage in the history of this war. In contrast to the first two and a half war years, the question of peace has from that moment been the centre of European, aye, of world discussion, and dominates it in ever increasing measure.

Almost all the belligerent States have in turn again and again expressed themselves on the question of peace, its prerequisites and conditions. The line of development of this discussion, however, has not been uniform and steady. The basic standpoint changed under the influence of the military and political position, and hitherto, at any rate, it has not led to a tangible general result that could be utilized.

It is true that, independent of all these oscillations, it can be stated that the distance between the conceptions of the two sides has, on the whole, grown somewhat less; that despite the indisputable continuance of decided

and hitherto unbridged differences, a partial turning from many of the most extreme concrete war aims is visible and a certain agreement upon the relative general basic principles of a world peace manifests itself. In both camps there is undoubtedly observable in wide classes of the population a growth of the will to peace and understanding. Moreover, a comparison of the reception of the peace proposal of the Powers of the Quadruple Alliance on the part of their opponents with the later utterances of responsible statesmen of the latter, as well as of the non-responsible but, in a political respect, nowise uninfluential personalities, confirms this impression.

While, for example, the reply of the Allies to President Wilson made demands which amounted to the dismemberment of Austro-Hungary, to a diminution and a deep internal transformation of the German Empire, and the destruction of Turkish European ownership, these demands, the realization of which was based on the supposition of an overwhelming victory, were later modified in many declarations from official Entente quarters, or in part were dropped.

Thus, in a declaration made in the British House of Commons a year ago, Secretary Balfour expressly recognized that Austria-Hungary must itself solve its internal problems, and that none could impose a Constitution upon Germany from the outside. Premier Lloyd George declared at the beginning of this year that it was not one of the Allies' war aims to partition Austria-Hungary, to rob the Ottoman Empire of its Turkish provinces, or to reform Germany internally. It may also be considered symptomatic that in December, 1917, Mr. Balfour categorically repudiated the assumption that British policy had ever engaged itself for the creation of an independent State out of the territories on the left bank of the Rhine.

The Central Powers leave it in no doubt that they are only waging a war of defense for the integrity and the security of their territories.

Far more outspoken than in the domain of concrete war aims has the rapproachement of conceptions proceeded regarding those guiding lines upon the basis of which peace shall be concluded and the future order of Europe and the world built up. In this direction President Wilson in his speeches of February 12 and July 4 of this year has formulated principles which have not encountered contradiction on the part of his allies, and the far-reaching application of which is likely to meet with no objection on the part of the powers of the Quadruple Alliance also, presupposing that this application is general and reconcilable with the vital interests of the States concerned.

It is true it must be remembered that an agreement on general principles is insufficient, but that there remains the further matter of reaching an accord upon their interpretation and their application to individual concrete war and peace questions.

To an unprejudiced observer there can be no doubt that in all the belligerent States, without exception, the desire for a peace of understanding has been enormously strengthened; that the conviction is increasingly spreading that the further continuance of the bloody struggle must transform Europe into ruins and into a state of exhaustion that will mar its development for decades to come, and this without any guarantee of thereby bringing about that decision by arms which has been vainly striven after by both sides in four years filled with enormous sacrifices, sufferings, and exertions.

In what manner, however, can the way be paved for an understanding, and an understanding firmly attained? Is there any serious prospect whatever of reaching this aim by continuing the discussion of the peace problems in the way hitherto followed?

We have not the courage to answer the latter question in the affirmative. The discussion from one public tribune to another, as has hitherto taken place between statesmen of the various countries, was really only a series

of monologues. It lacked, above everything, directness. Speech and counterspeech did not fit into each other. The speakers spoke over one another's heads.

On the other hand, it was the publicity and the ground of these discussions which robbed them of the possibility of fruitful progress. In all public statements of this nature a form of eloquence is used which reckons with the effect at great distances and on the masses. Consciously or unconsciously, however, one thereby increases the distance of the opponents' conception, produces misunderstandings which take root and are not removed, and makes the frank exchange of ideas more difficult. Every pronouncement of leading statesmen is, directly after its delivery and before the authoritative quarters of the opposite side can reply to it, made the subject of passionate or exaggerated discussion of irresponsible elements.

But anxiety lest they should endanger the interests of their arms by unfavorably influencing feeling at home, and lest they prematurely betray their own ultimate intentions, also causes the responsible statesmen themselves to strike a higher tone and stubbornly to adhere to extreme standpoints.

If, therefore, an attempt is made to see whether the basis exists for an understanding calculated to deliver Europe from the catastrophe of the suicidal continuation of the struggle, then, in any case, another method should be chosen which renders possible a direct, verbal discussion between the representatives of the governments, and only between them. The opposing conceptions of individual belligerent States would likewise have to form the subject of such a discussion, for mutual enlightenment, as well as the general principles that shall serve as the basis for peace and the future relations of the States to one another, and regarding which, in the first place, an accord can be sought with a prospect of success.

As soon as an agreement were reached on the fundamental principles, an attempt would have to be made in the course of the discussions concretely to apply them to individual peace questions, and thereby bring about their solution.

We venture to hope that there will be no objection on the part of any belligerents to such an exchange of views. The war activities would experience no interruption. The discussions, too, would only go so far as was considered by the participants to offer a prospect of success. No disadvantages would arise therefrom for the States represented. Far from harming, such an exchange of views could only be useful to the cause of peace.

What did not succeed the first time can be repeated, and perhaps it has already at least contributed to the clarification of views. Mountains of old misunderstandings might be removed and many new things perceived. Streams of pent-up human kindness would be released, in the warmth of which everything essential would remain, and, on the other hand, much that is antagonistic, to which excessive importance is still attributed, would disappear.

According to our conviction, all the belligerents jointly owe to humanity to examine whether now, after so many years of a costly but undecided struggle, the entire course of which points to an understanding, it is possible to make an end to the terrible grapple.

The Royal and Imperial Government would like, therefore, to propose to the governments of all the belligerent States to send delegates to a confidential and unbinding discussion on the basic principles for the conclusion of peace, in a place in a neutral country and at a near date that would yet have to be agreed upon—delegates who were charged to make known to one another the conception of their governments regarding those principles and to receive analogous communications, as well as to request and give frank and candid explanations on all those points which need to be precisely defined.

The Royal and Imperial Government has the honor to request the government of ——, through the kind mediation of Your Excellency, to bring this communication to the knowledge of the government of ——.

[The names of the intermediary government and of that addressed in the particular note dispatched are left blank.]

PRESIDENT WILSON'S REPLY

Secretary Lansing's announcement regarding the Austrian Note, issued on September 16, immediately after the receipt of the official text, was brief and pointed, as follows:

"I am authorized by the President to state that the following will be the reply of this government to the Austro-Hungarian Note proposing an unofficial conference of belligerents:

"'The Government of the United States feels that there is only one reply which it can make to the suggestion of the Imperial Austro-Hungarian Government. It has repeatedly and with entire candor stated the terms upon which the United States would consider peace and can and will entertain no proposal for a conference upon a matter concerning which it has made its position and purpose so plain.'"

RESTRICTION OF DISCUSSION.—It has been suggested that, denied unlimited fields of secret discussion of war issues, Austria may attempt a coup by assenting to a restriction of the discussion to the principles laid down by President Wilson as the only possible basis of peace.

It was said authoritatively today that such a proposition undoubtedly would be accepted. But this statement was accompanied by a significant reminder of conditions which must be met preliminary to any such discussion. These are that the Central Powers:

Must withdraw completely from all occupied territory in France and Belgium, Italy, Russia, and Serbia.

The Germans must drop the subterfuge of the Brest-Litovsk treaty made by Germany with Russian agents hired to betray their country.

They must loosen their hold upon the wheat fields of Ukrainia and the oil wells of Serbia and Russia.

And all this must be done before America would consent to talk of peace, even upon the basis of the President's stipulation.

GERMAN OFFER TO BELGIUM.—Coincident with the Austrian peace maneuver, and evidently in concert with it, Germany offered definite terms to Belgium, reported as follows:

That Belgium shall remain neutral until the end of the war.

That thereafter the entire economic and political independence of Belgium shall be reconstituted.

That the pre-war commercial treaties between Germany and Belgium shall again be put into operation after the war for an indefinite period.

That Belgium shall use her good offices to secure the return of the German colonies.

That the French question shall be considered and the Flemish minority, which aided the German invaders, shall not be penalized.

The proposal contains no word respecting reparation or indemnities, no admission that Germany wronged Belgium.

This peace offer was made to the King of Belgium some time ago and immediately communicated to the Allied powers, but was kept secret until the Austrian offer was made.

It is understood that the Belgian Government has received the Austro-Hungarian peace note, and also a proposal that all the powers should withdraw their troops from the Murman territory.

CHANGED ATTITUDE OF GERMAN SPEECH-MAKERS.

The altered tone of the speeches of both royalty and government officials in Germany indicated clearly their decision that the best prospect for the Central Powers lay in an early negotiated peace. The change in the Crown Prince's attitude is reflected in the following interview:

Amsterdam, September 4.—The German idea of victory, as defined by the German Crown Prince, in an interview published in the Budapest Az Est, is an intention "to hold our own and not let ourselves be vanquished." The Crown Prince is quoted as saying that this was clear to him the moment England entered the war.

"If Germany had wanted war," he said, "we should not have chosen this moment. No moment could have been more unfavorable for Germany."

In reply to the question as to how he thought the end of the war would come, he replied:

"Through the enemy perceiving that they are not equal to the winning of their colossal stake, and that they cannot win as much as they are bound to lose."—*N. Y. Times*, 5/9.

VON PAYER GIVES UP INDEMNITIES.—Amsterdam, Thursday, September 12.—Reiterating that Germany "as the innocent and attacked party" in the war had a right to demand indemnification, Friedrich von Payer, the German imperial vice chancellor, in his speech today at Stuttgart, said that "we prefer on calm reflection, and even with our own favorable military situation, to abandon this idea."

Turning to the question of the occupied territories, the vice chancellor said that as a preliminary condition of peace for Germany and her allies those nations must have all their pre-war possessions, including the German colonies, restored. Then Germany, he declared, could evacuate the occupied regions and could give back Belgium without incumbrance and without reserve, providing no other state was more favorably placed in regard to Belgium than was Germany.

He asserted that Germany would not submit to the Entente Powers for approval or alteration the peace treaties which Germany had signed with the Ukraine, Russia and Roumania.

The postponement of peace prospects and the likelihood of a fifth war winter weigh equally on all belligerents and not only Germany alone, in the opinion of the vice chancellor.

"Our state debts," the vice chancellor said, "are everywhere reaching fantastic heights and everywhere we struggle against the encroachments on our personal liberty. All of the belligerents of Europe must admit, if they are not blind, that the longer the European peoples lacerate each other the more certainly will the historical and paramount position of weakened and impoverished Europe be lost in favor of cleverer and more calculating peoples."

Herr von Payer reminded his hearers that after four years the war still was being waged almost entirely on enemy territory. He admitted that the U-boat had not worked as quickly and surely as had been hoped. He added that it was useless to dispute whose was the fault. The enemy, he said, was still unable to compensate their losses by new construction, and declared that the robbery of neutral ships, almost without parallel, by the Entente could not be repeated.

"The more troops the United States sends the greater will be the need of shipping for reinforcements of munitions and provisions," Herr von Payer said. "The filling up of the enemy army by Americans, therefore, bears in itself its limitations."

He argued that the loss of shipping would become fatal to Great Britain after the war because it would lose its shipping superiority to the United

States, "and the hope of compensating themselves from the German fleet, which still has to be conquered, will surely be inadequate comfort for the very imaginative Britishers."

Contending that technique and inventive genius, which already had helped the Germans over heavy obstacles, would still help them, Herr von Payer said:

"If we lack cotton and oils our enemies lack coal. Food is scarce here and there, but already things probably have turned in our favor. In the east the world is again open to us for a food supply, while our enemies' supplies of foodstuffs and raw materials give precedence to the front's calls for America's armies and their provisioning."—*Washington Star*, 13/9.

BURIAN PAVES WAY FOR PEACE OFFER.—Amsterdam, September 10.—An exchange of views between the Central Powers and the Entente was tentatively suggested by Baron Burian, the Austro-Hungarian Foreign Minister, in an address to visiting German newspaper men, according to a Vienna dispatch today. Such a discussion, said the Foreign Minister, need not take the form of peace negotiations, but would have as its purpose the consideration of all things which are keeping the belligerent powers apart.

"This question arises," said the Foreign Minister: "Isn't it a crime against humanity even to think of completely pulling down a structure which has become historical, and which certainly here and there needs improvement, but is only capable of improvement, in order to found a paradise in future on its ruins? The defect in this, however, is that in accordance with the destructive methods of our enemies it can only be created with a much too great sacrifice.

"Count the past hecatombs of this war. Think of those to come and ask whether striving to attain war aims at such a price is justifiable—war aims in which the principle of justice is put foremost—without investigating whether an understanding could not be reached by a fair application of that principle.

"It is unthinkable that even the most confident hopes of final victory could permit the enemy in the long run to avoid considering whether the most terrific exertions and sacrifices can longer be justified in order to carry through principles which are not the enemy's monopoly or to regulate the affairs of other peoples who can manage them quite as well themselves.

"I believe that careful and sincere investigation would bring many on the other side to realize that they often are fighting for imaginary things. It may be an ungrateful task to want to communicate one's own perceptions of things to the enemy.

"The enemy group can, if it wishes, convince itself that in all questions of humanity and justice and of future international relations it will encounter on the part of our group no opposition and will be in line with our existing progressive aspirations. But at the same time it will meet our determination to continue steadfastly to stand up for our good right.

"Our adversaries need only provide an opportunity in a calm exchange of views—some sort of direct informative discussions is thinkable which would be far from being peace negotiations—of discussing and weighing everything which today separates the belligerent parties, and no further fighting will, perhaps, be needed to bring them closer together.

"But I would not delude you with baseless prospects of peace at a moment when the war fever still is shaking the world. I must, however, talk to you of peace because we honestly want it and because we are certain there is an ever-growing number of like-minded persons in all enemy countries.

"We desire to contribute to the best of our ability to a mutual understanding and help to pave a way for conciliation. But, so long as necessary, we shall hold out in a loyal and resolute joint defense."—*N. Y. Times*, 11/9.

GERMANY WANTS HER COLONIES BACK.—In a speech before the German Society on August 21, Dr. W. S. Solf, German Secretary for the Colonies, expressed clearly Germany's concern for her lost over-seas possessions. He said that Belgium would be restored as an independent state, but that "the safeguarding of our colonial future has become an aim of the German people" and "our colonial war aims are second to none in national importance."

To Mr. Balfour's condemnation of German colonial policy and methods, Dr. Solf replied with a charge of *tu quoque*. Regarding German aggressions in Russia, he said:

"The Brest-Litovsk peace came about by agreement between the Russian and German Governments, that the frontier peoples of Russia after centuries of oppression should be permitted to live their own national life, for which object they had been striving. This agreement on the fate of the border peoples is a fact of world importance which never can be erased from history.

"Not about the aim, but about the ways and means leading to conferring their own national life upon these peoples, did the Russian and German conceptions differ. Our conception was and is that the path to freedom shall not lead through anarchy to wholesale murder. Between the first bursting of the bonds and full capability for self-determination of the border peoples there lies a natural transitory period. Until the regulation forces should co-operate in the various countries, Germany felt called upon to protect these communities in their own, as well as in the general, interest, as indeed she has been called upon to do by both national majorities and minorities.

"The Brest-Litovsk peace is a framework, and the picture which is to appear within is only sketched in rough lines.

"England forfeited the right to act as moral champion of the Russian border States in their unparalleled time of suffering. During the war they repeatedly appealed to England for help. It was always denied them."

SECRETARY BALFOUR ON AUSTRO-GERMAN OVERTURES.—London, September 16.—A. J. Balfour, the British Foreign Secretary, giving his personal viewpoints on the Austrian peace note to visiting journalists, said:

"It is incredible that anything can come of this proposal."

The Foreign Secretary said he agreed with the Austrian Note when its authors pointed out that the whole of civilization was at stake and that the prolongation of hostilities was a risking or sacrificing of a great deal that was really dear to everybody interested in the progress of mankind. The terms of peace and war were so tremendous, and the calamities imposed by the continuation of hostilities so overwhelming, that he would never treat with disrespect any peace proposal.

"But," he went on, "I cannot honestly see, in the proposals now made to us as I have been able to study them, the slightest hope that the goal we all desire—the goal of a peace which shall be more than a truce—can really be attained."

Coming after the recent speech of Friedrich von Payer, the German Imperial Vice Chancellor, Mr. Balfour continued, "this cynical proposal of the Austrian Government is not a genuine attempt to obtain peace. It is an attempt to divide the Allies." No coalition ever had been so strong as the allied coalition and the enemy would not succeed in breaking it.

Conversations such as were proposed by Austria-Hungary undoubtedly would have great value under certain circumstances. They would serve to smooth out obscurities such as questions of pride, etc., but the questions now between the belligerents were definitely defined.

"I am not taking the proposals of two years ago, or of last year, but of last week," Secretary Balfour said. "The German Vice-Chancellor,

speaking for the German Government, clearly and without obscure verbiage, showed where Germany stood on the question of Belgium, Alsace-Lorraine, the German colonies, and the Brest-Litovsk and Bucharest treaties."

It could not be more clearly set forth than it was by von Payer last week that Germany intended to pay no indemnity to Belgium. The Vice-Chancellor indicated that Germany did not believe in the principle of indemnities, and yet at the same time she was squeezing millions of dollars out of Russia.

"This," the speaker went on, "was for the wrongs Russia is supposed to have done Germany. How can those wrongs be compared with the devastation and ruin which Germany is wreaking on Russia now?"

Regarding the question of colonies, Secretary Balfour said:

"The colonies are one question on which there is no misunderstanding. We stand on one side and Germany on the other."

Referring to the lack of concerted effort by the Central Powers, as emphasized by the von Payer speech and the Austrian Note, the Foreign Secretary commented on the clumsiness of German diplomacy.

"The German," he added, "excels in direct, simple brutality, but when he tries to dress in President Wilson's clothes or tries to act as President Wilson would act, he is clumsy."

GERMANY

SAFETY OF CROWN HINGES ON FRANCHISE.—In a speech which afterward caused wide discussion Chancellor von Hertling on September 4 declared that the protection of the Prussian crown and dynasty required the passage of a satisfactory franchise reform bill.

Amsterdam, September 5.—"According to my honest belief as to this difficult question (the reform of the Prussian franchise) it is a matter of protection of the Crown and the dynasty. Any suspicion that an effort is being made to postpone the matter will add fuel to the agitation and lead to serious disturbances."

So declared Chancellor von Hertling in the course of his most pointed speech to the Franchise Reform Committee of the Prussian Upper House, which met yesterday to deal with that measure of reform solemnly promised more than a year ago by the Kaiser, as King of Prussia.

As is well known, the Prussian reactionaries not only delayed the bill, but so altered it that it no longer is worthy of the name of a measure of reform, but instead has become one of the purest reaction. Throughout the country this Junker defiance of the Prussian King and the government has aroused not only in Prussia but in all Germany the most serious anger and unrest.

Has Hertling read the signs of the times at last? He spoke very briefly and very emphatically. The eyes of all political circles, and not only in Prussia, he said, were directed toward them and the decisions to which they had to come.

"The government regards it as its task," he declared, "to carry out that royal promise made in the manifesto of July of last year. Just as all sons of the Fatherland have defended the country by putting forth all their strength; just as in war there has been no question of social distinctions, and high and low, rich and poor, old and young, have done their duty in the same way; so after the war, in the peace for which we hope, there must be no social distinctions in the political activity of voting."

To bring that about, he said, was one of the duties he took upon himself when he assumed office; and he declared himself to be firmly determined to preserve with all his strength and to stand or fall by it.—*N. Y. Times*, 7/9.

RUSSIA

SUPPLEMENTARY AGREEMENTS WITH GERMANY.—Copenhagen, August 30.—The North German Gazette explains the import of the three supplementary agreements to the Brest-Litovsk peace treaty signed in Berlin on August 27. It says the agreements are intended to regulate a number of political and military-political questions arising from the fact that Russia's relations with the border States are still unsettled.

"Esthonia and Livonia stand in the foreground of German interest. The supplementary agreements contain a solution which assures the Baltic States independence, but gives Russia routes of commerce to and from ports on the Baltic for all time.

"Germany succeeded in getting Russia's consent to recognition of the independence of Georgia, but it was impossible to secure Russia's consent to acknowledge other States in the Caucasus. The Russian Government laid the greatest weight on assuring to itself the Baku territory with its rich naphtha fields. Germany could not disregard this wish in view of the fact that Russia pledged itself to place a portion of the naphtha production at the disposal of Germany and its allies.

"The 6,000,000,000 marks which Russia undertakes to pay Germany includes all sums lost by Germans up to July 1, 1917, through Russian revolutionary confiscatory legislation.

The newspaper adds that of the 6,000,000,000 marks Russia has agreed to pay, Ukraine and Finland jointly will pay 1,000,000,000.

Washington, September 10.—What is regarded as closely approximating an offensive and defensive alliance between Germany and the Bolshevist Government in Russia is involved in the treaty just negotiated between them, the first official information concerning which reached the State Department today in a dispatch from American Ambassador Francis at Archangel.

The Ambassador confirmed recent news that the new treaty supplementary to that of Brest-Litovsk provides that if the Bolshevist Government orders an offensive and fights against the Entente allied forces in Northern Russia, Germany will guarantee Russia against attack either by or through Finland. The treaty also stipulates that after the expulsion of the allied forces from Russia, Germany will guarantee the security of the coasting and fishing fleets of Russia in Russian waters.

So far as can be ascertained from official sources all that Russia obtains in return for the 6,000,000,000 marks she has agreed to pay to Germany and for undertaking an offensive against the Entente forces stretched southward along the railway from Archangel toward Vologda, is a guarantee of protection against attack by, or through, Finland, and a contingent guarantee of protection to the Russian coastal and fishing fleets.—*N. Y. Times*, 11/9.

RAIDS AND MASSACRES BY SOVIETS.—On August 31 Bolshevist troops sacked the British Embassy in Petrograd and murdered Captain Francis Cromie, a former British submarine officer, afterward attached to the legation in Petrograd. The British Government at once telegraphed a protest demanding immediate reparation and punishment, failing to secure which Great Britain would hold members of the Soviet Government individually responsible and endeavor to have them treated as outlaws by all civilized nations. The message stated that the Soviet Ambassador in London, with his staff, had been placed under preventive arrest pending the release of British and French subjects arrested in Russia by decree of August 29.

An official announcement made at Petrograd and reported from Amsterdam on September 9 stated that up to that time 512 so-called counter-

revolutionaries had been put to death in reprisal for the murder of Moses Uritzky, a Soviet official in Petrograd.

Stockholm, Sept. 17.—Wholesale executions are increasing in Petrograd, according to private telegrams received here by the way of Helsingfors. During the past week 812 persons were executed, and more than 400 others are on the proscribed list. Most of them have already been made hostages.

All persons of the rank of councillors of state have been imprisoned regardless of their political views.

ALLIES DENY HOSTILE ATTITUDE.—Archangel, August 22.—An official announcement issued today by the Entente Allied Governments in the northern region of Russia denied the statement recently made by Lenine and Trotzky, the Bolshevist Premier and War Minister, respectively, that Great Britain, France and the United States were enemies of Russia. The allied military action, the announcement added, was aimed at the expulsion of the Germans from Russian territory and the suppression by force of arms of the Brest-Litovsk treaty. The statement follows:

Lenine and Trotzky declare that the British, French, and Americans who disembarked at Archangel are brigands, and they call upon the Russian proletariat to fight against them as enemies of Russia who attacked her without a declaration of war.

We declare to all Russian citizens for whom the welfare of Russia is dear that this is not true. The British, French, and Americans at Archangel are the allies of Russia. They were invited to make a landing here by the legitimate government and with the complete and unanimous agreement on the part of the population.

The government of the northern region is composed of members of the Constituent Assembly, which was elected by the whole population of the northern border district.. It comprises also representatives of the Zemstvos and municipalities, elected by universal suffrage.

This government has been formed and was overturned by the illegitimate Bolshevist Government before the descent of the Allies. It was formed on the initiative of the League for the Regeneration of Russia, which reunites representatives of all the political parties recognizing the Constituent Assembly as the only rightful Russian Government.

The Allies, then, were called to Russia by the only legitimate and representative authority, for the purpose of military action in common aiming at the expulsion of the Germans and the complete suppression by force of arms of the Brest-Litovsk treaty, traitorously signed by the Bolsheviki. But they were called on the distinctly specified condition that they must not mix themselves in the internal affairs of the government of Russia.—*N. Y. Times*, 26/8.

ATTEMPT TO KILL LENINE.—On August 30, Nickolai Lenine, Bolsheviki Premier, was shot and seriously wounded. Dispatches from Moscow on September 4 reported his condition as still serious. Mlle. Dora Kaplan, who shot Lenine, was prominent in the Social Revolutionary Party. She was put to death on September 4, according to news from Moscow via Berlin.

FINLAND AND THE ARCTIC COAST.—Finland's desire for Petchenga is easily explained. The Russian and Norwegian coasts meet on the Arctic and cut Finland off from ice-free water. Finland is therefore restricted to navigation via the Baltic. Only at the expense of either Norway or Russia could she reach the ocean. The acquisition from Russia of a narrow belt of land at Petchenga would give her the outlet she needs. The Finns adduce three arguments in support of their plan. First, they

allege, the Petchenga territory was promised to them long ago by Russia in exchange for territory ceded in South Finland. Second, the Bolshevik Government last winter agreed to cede Petchenga to the short-lived Finnish Red Government in exchange for Ino and Raivola, two districts on the Gulf of Finland which are necessary for the defence of Kronstadt. Third, the Petchenga population is mostly Finnish. The Bolshevik Government is apparently still willing to carry out this cession. In May, the Assistant Foreign Minister, Vosnessensky, defended the "deal" on the ground that the greatest width of the territory to be ceded is only forty-five miles, and that as the new Finnish stretch of coast on the Arctic would be seventy miles from Murmansk, Russia's port and railroad would be in no danger. In a later statement Vosnessensky declared that the Allies need not be nervous, as the Germans had no intention of establishing themselves on the Arctic. To this a group of Young-Finnish politicians who oppose the Helsingfors policy of too close union with Germany replied that "as long as Finland and Germany are identical in Allied minds, the acquisition by Finland of Petchenga will inevitably be regarded as a threat, even if the Murman Railway is left intact."

The second Finnish claim—to part of the Russian Government of Olonetz and to part of the interior of Archangel—is inspired by Irredentist motives. The districts claimed are known as "Russian Karelia." . . . .

In Olonetz, in territory adjoining Finland proper, are about 70,000 Karelians and Tchuds (another Karelian race); and in Archangel, mostly in the district of Kem, are about 20,000 Karelians. The northwest of Olonetz is not only ethnically, but also geologically, part of Finland. By pushing her frontier eastward from 50 to 100 miles, Finland would achieve her aim.

The Irredentist movement is purely an outcome of the Russian revolution. The Finns at home are all Lutherans, whereas the Karelians in Russia are Greek Orthodox. Of 70,000 Karelians and Tchuds in Olonetz, only 3,000 are registered as Lutherans, and these are immigrants from the former Grand Duchy of Finland. The whole population now claimed by Finland as Irredenta, however, does not number more than 100,000, and there would probably have been no annexation agitation at all had not Finland's national self-consciousness been strengthened by independence, and had not the Bolshevik régime given the Russian Karelians cause of complaint.

Finland's argument is that as long as she does not annex any Russian territory traversed by the Murman Railway, her acts do not threaten the railroad, and have therefore no particular importance for the war. The real issue here is obviously not Finland but Germany. The Allied note protesting against annexation of any Russian territory implies that, with Finland at Petchenga on the Arctic Ocean, or within striking distance of Petrozadovsk, the whole Murman coast and railroad could be threatened at any time should Germany decide to move northward or eastward. In that lies the gravity of the Murman question.—*Robert Crozier Long, N. Y. Nation*, 31/8.

HORVATH'S COUP A FAILURE.—Washington, August 28.—The self-appointed dictatorship of Lieut. Gen. Horvath, anti-Bolshevik military leader in Eastern Siberia, under which he sought to assume control of all the Russian military forces in the Far East, was short-lived.

Diplomatic advices from Vladivostok were received in Washington today stating that his coup d'êtât had failed through the intervention of the allied representatives at Vladivostok, who informed his representative, General Pleshkoff, that the authority of the new Siberian Government would be upheld.

According to those advices the coup of General Horvath was of scarcely an hour's duration. The diplomats made very clear that no government based on personal assumption of power would be acceptable to the Entente

Powers, but that they were prepared to support governments in Russia that were based on a free expression of popular sentiment.

There was nothing left for General Horvath but to reliquish his pretensions to hold the reins of governmental power.—*N. Y. Times*, 29/8.

LENINE AND TROTZKY UNDER GERMAN PAY

Washington, September 14.—Proofs removing any doubts that Lenine and Trotzky, the Bolshevik leaders, are paid German agents—if indeed any doubts remain—are laid before the world today by the United States Government in the first installment of an amazing series of official documents disclosed through the Committee on Public Information.

Secured in Russia by American agents, these documents not only show how the German Government through its Imperial Bank paid its gold to Lenine, Trotzky and their immediate associates to betray Russia into deserting her Allies, but give added proofs, if any be necessary, that Germany had perfected plans for a war of world conquest, long before the assassinations of Sarevejo, which, as the world is now convinced, conveniently furnished her pretext.

These documents further show that before the world war was four months old, and more than two years before the United States was drawn into it, Germany was already setting afoot her plans to "mobilize destructive agents and observers," to cause explosions, strikes and outrages in this country and planned the employment of "anarchists and escaped criminals" for the purpose.

Human Treachery for Gold.—Almost ranking in their sensational nature with the notorious Zimmermann note proposing war by Mexico and Japan upon the United States, which was first given to the world through the Associated Press, these documents lay bare new strata of Prussian intrigue, a new view of the workings of Kultur to disrupt the Allies, standing between the world and Kaiserism. They disclose a new story of human treachery for gold which might almost well be described without sacrilege as placing its perpetrators on a pedestal with Judas and his twelve pieces of silver.

The intrigue appears to have been carried down to the last detail of arrangement with typical German system. Not only do the disclosures prove that Lenine, Trotzky and their band are paid German agents, they show that the Bolshevik revolution which threw Russia into such orgy of murder and excesses as the world seldom has seen, actually was arranged by the German General Staff. They show how the paid agents of Germany betrayed Russia at the Brest-Litovsk "peace" conference; how German staff officers secretly have been received by the Bolsheviki as military advisers; how they have acted as spies upon the embassies of the nations with which Russia was allied or at peace, how they effectually have directed the Bolsheviki foreign, domestic and economic policy wholly in the interest of Germany and the shame and degradation of Russia.

They show how a picked German commander was detailed to "defend" Petrograd against the German army and an extent of German intrigue and domination almost beyond the realm of imagination.

The Committee Statement.—The Committee on Public Information statement says, in part:

The documents are some seventy in number. Many are originals, annotated by Bolshevik officials. The remainder are photographs of originals, showing annotations. And they corroborate a third set of typewritten circulars, of which only two originals are possessed, but all of which fit perfectly into the whole pattern of German intrigue and German guilt.

The first document is a photograph of a report made to the Bolshevik leaders by two of their assistants, informing them that in accordance with their instructions there had been removed from the archives of the Russian Ministry of Justice the order of the German Imperial Bank "allowing

money to Comrades Lenine, Trotzky 'and others' for the propaganda of peace in Russia," and that at the same time "all the books" of a bank in Stockholm had been "audited" to conceal the payment of money to Lenine, Trotzky and their associates by order of the German Imperial Bank.

Document No. 3 is the original protocol signed by several Bolshevik leaders and dated November 2, 1917, showing that "on instructions of the representatives of the German General Staff in Petrograd" and "with the consent of the Council of People's Commissars," of which Trotzky and Lenine were the heads, two incriminating German circulars had also been "taken from the department of secret service of the Petrograd district" and given to the secret service department of the German General Staff in Petrograd. On the bottom of the protocol the German adjutant acknowledges receipt of the two incriminating circulars with his cipher signature. And to complete the evidence the circulars are themselves penciled with the cipher signature of the head of the German secret service bureau.

These two circulars apparently had been obtained by some Russian agent in Germany and transmitted to Russia. The German General Staff evidently wished to get them back in order to destroy them. By the order of the German General Staff and with the "consent" of Lenine and Trotzky they were turned over to the Germans to be destroyed. Why? Because they are conclusive proof that on June 9, 1914, the German Government was preparing for war, several weeks before the assassination of the Austrian Archduke, which was made the pretext for war.

One circular is an order from the German General Staff, dated June 9, 1914, informing "all industrial concerns" in Germany to open the sealed envelopes containing their "industrial mobilization plans and registration forms" so that they might be prepared for the war for which the excuse had not yet been found.

The second circular is an order from the German General Staff of the high sea fleet, dated November 28, 1914, calling for the mobilization of "all destructive agents and observers" in the United States and Canada for the purpose of preventing the sailing of ships from American ports to Russia, France, and England. The order calls for explosions, strikes, "delays, embroilments, and difficulties," and it recommends the employment of "anarchists and escaped criminals" for the purpose..

Real Damning Proofs.—It is these damning proofs of a German conspiracy against the nations of Europe in June, 1914, and against the United States in November, 1914—it is these that Lenine and Trotzky surrender to the German Secret Service in Petrograd on order of "the representatives of the German General Staff in Petrograd."

And they surrender them in conformity with a working agreement between the Bolshevik leaders and the German General Staff, of which agreement a photograph is included in the series as Document No. 5.

A Hun Election.—What their "mutual activities" were to be is sufficiently indicated by Document No. 7, which is a photograph of a letter signed in cipher by this Major Luberts and his adjutant, Lieutenant Hartwig. They notify the Bolshevik leaders, on January 12, 1918, that "by order of the German General Staff" the German intelligence section "has informed us of the names and the characteristics of the main candidates for re-election" to the Russian Bolshevik "central executive committee," and "the General Staff orders us to insist on the election of the following people." They add a list of Russian leaders satisfactory to the German General Staff. The list is headed by Trotzky and Lenine. They were elected, and the rest of the present Bolshevik executive committee were chosen from the same German list.

Document No. 28 gives evidence of the quid pro quo. It is a photograph of a letter from the president of the German Imperial Bank to the Bolshevik commissar of foreign affairs. It is marked "Very secret" and dated January 8, 1918. It says: "Information has today been received by

me from Stockholm that 50,000,000 rubles of gold have been transferred to be put at the disposal of the people's commissars," which is the title of the Bolshevik leaders. "This credit," the letter continues, "has been supplied to the Russian Government in order to cover the cost of the keep of the Red Guards (the Bolshevik revolutionary troops) and agitators in the country. The Imperial Government considers it appropriate to remind the soviet of people's commissars of the necessity of increasing propaganda in the country, as the antagonistic attitude of the south of Russia and Siberia to the existing (Russian) Government is troubling the German Government."

Four days later the same president of the German Imperial Bank sent another 5,000,000 rubles to the same address to provide for the sending of a Russian revolutionary leader to Vladivostok to get possession of the "Japanese and American war materials" at that port, and if necessary to destroy them. A photograph of his letter is given as Document No. 9.

There were earlier payments, but probably none later than these. None was necessary. By this time the loot of an empire lay open to the Bolsheviks and the Germans.

Spies to America.—In Document 16 Trotzky is providing fraudulent passports for German officers who are going to England, France and America, as spies and enemy agents. And Document 17 shows Trotzky indorsing a similar proposal "to be urgently executed. L. T."

Three German submarines are to be sent to the Pacific on the trans-Siberian Railway by orders of the German high command in Document No. 23. Lists of German and Russian spies watching the British, French and American Embassies in Petrograd are given in Document No. 25. And, finally, in Document No. 15 the Bolshevik leaders are warned that information concerning "the connection of the German Government with the Bolshevik workers" has leaked out and that Russian troops are hearing of it.

Letters are given to show how the Bolshevik leaders and the German officers arranged for the assassination of Russian Nationalist leaders (Documents 35, 39 and 52), for the destruction of the Polish legionaries in the Russian Army (Documents 40 to 42), for the disorganization of the Roumanian army and the deposing of the Roumanian king (Document No. 37), for the substitution of officers satisfactory to Germany in command of Russian troops instead of patriotic Russian generals (Documents 31 and 31), for the suppression of patriotic agitation among the Russian soldiers (Documents 13 and 14), for an attack upon the Italian Ambassador in Petrograd and the theft of his papers (Documents 26 and 27) and for the employment of German soldiers in Russian uniforms against the Russian national armies in the South (Document 35).

Several of the letters are indorsed by Trotzky. Even standing alone, they are complete proof that the Bolshevik leaders were ruling as German agents in Russia and obeying German orders to act against all Germany's enemies and even against Russia itself.

Suppressed Own Revolution.—Moreover, these Bolshevik leaders acted as German agents by suppressing their own Socialist revolution in the Russian provinces where their doctrines interfered with German plans of annexation. Document 46 is the original letter from the Petrograd department of the German General Staff, addressed to the Bolshevik Commissar of Foreign Affairs. It reads: "According to instructions of the representatives of our General Staff, I have the honor once more to insist that you recall from Estland, Litva and Courland all agitators of the Central Executive Committee of the Soviet of Workmen and Soldiers' Deputies." And in Document 47 the General Staff orders the Bolsheviki to cease the agitation in Estland which had "finally led to the German landlords being declared outlawed," and to "take immediate steps for the restoring of the rights of the above-mentioned German landlords."

Another group of letters (Nos. 33 to 36) shows how the Germans cheated the Bolshevik leaders in their dealings with the Ukraine and made a separate German peace with the anti-Bolshevik leaders in that Russian province. And another group shows the Germans assisting both sides of the civil war in Finland (Documents 38, 43 and 53).—*Baltimore Sun*, 15/9.

UNITED STATES

HAMBURG-AMERICAN PLANT IN VIRGIN ISLANDS SEIZED.—On September 12 agents of Alien Property Custodian Palmer seized in the Virgin Islands the large marine plant owned by the Hamburg-American line and German capital, but the title of which had been transferred to a Danish Hun sympathizer by a camouflage sale.

The plant admitted possibilities as a naval base, and included land, buildings, docks, warehouses, large water tanks and cisterns, lighters, motor boats, loading paraphernalia and coaling facilities.

That the Germans intended it for a naval base was proved by the fact that the principal building commanding the harbor is of reinforced concrete, and the plaza in the foreground has an eight-foot foundation of concrete, fit for gun emplacements.

In January of last year, prior to the declaration of war by the United States on Germany, the business agent of the Hamburg line, who was also German consul at St. Thomas, sold the plant to the line's lawyer, Jorgensen, when it was ascertained that the United States had purchased the Dutch West Indies from Denmark. The sole consideration was his note for $210,000, given by Lawyer Jorgensen to the Hamburg line, payable three months after date and renewable every three months until after the war. No interest was to be paid until final settlement. These stipulations already noted and others contained in the bill of sale made it clear to government authorities that bungled German camouflage was once more at work.—*Washington Star*, 13/9.

SENATOR LODGE, REPUBLICAN LEADER, DEMANDS DICTATED PEACE.—Following the death of Senator Gallinger of New Hampshire, Senator Lodge of Massachusetts became Republican leader of the United States Senate. In his first speech, Senator Lodge characterized his peace terms as an "irreducible minimum," and outlined them thus:

Belgium must be restored.

Alsace and Lorraine must be returned to France—unconditionally returned—not merely because sentiment and eternal justice demand it, but because the iron and coal of Lorraine must be forever taken from Germany.

Italia Irredenta—all those areas where the Italian race is predominant, including Trieste—must go back to Italy.

Serbia and Roumania must be established in their independence.

Greece must be made safe.

Most important of all, if we are to make the world safe in the way we mean it to be safe, the great Slav population now under the Government of Austro-Hungary—the Jugoslavs and the Czechoslovaks, who have been used to aid the Germans, whom they loathe—must be established as independent States.

The Polish people must have an independent Poland.

We must have these independent States created so that they will stand across the pathway of Germany to the East. Nothing is more vital than this for a just, a righteous, and an enduring peace.

Constantinople must be finally taken away from Turkey and placed in the hands of the allied nations as a free port, so as to bar Germany's way to the East and hold the Dardanelles open for the benefit of mankind.

Palestine must never return to Turkish rule, and the persecuted Christians of Asia Minor—the Syrians and the Armenians—must be safe.

"LUSITANIA" SUITS DECIDED.—Suits against the Cunard Company for damages due to loss of life and property in the sinking of the *Lusitania* on May 7, 1915, were decided on August 24, 1918, by Judge Julius M. Mayer of the United States District Court of New York. The Judge in his decision held it proved that the *Lusitania* was unarmed and had no explosives of any kind on board, that all safety measures were taken, and that her sinking by a German submarine was an act of piracy, "an inexpressibly cowardly attack," in violation of the law of nations, for which Germany must be held responsible.

UNITED STATES RECOGNIZES CZECHOSLOVAKS AS BELLIGERENTS.—On September 3 Secretary Lansing issued the following statement recognizing the Czechoslavak nation, and Professor Masaryk as President of the *de facto* government:

The Czechoslovak peoples having taken up arms against the German and Austro-Hungarian Empires, and having placed organized armies in the field, which are waging war against those Empires under officers of their own nationality and in accordance with the rules and practices of civilized nations; and,

The Czechoslovaks having, in prosecution of their independent purposes in the present war, confided supreme political authority to the Czechoslovak National Council,

The Government of the United States recognizes that a state of belligerency exists between the Czechoslovaks thus organized and the German and Austro-Hungarian Empires.

It also recognizes the Czechoslovak National Council as a *de facto* belligerent government, clothed with proper authority to direct the military and political affairs of the Czechoslovaks.

The Government of the United States further declares that it is prepared to enter formally into relations with the *de facto* government thus recognized for the purpose of prosecuting the war against the common enemy, the Empires of Germany and Austria-Hungary.

SPAIN

SPAIN SEIZES GERMAN SHIPS.—On August 21, following a long series of protests, Spain issued a statement of her decision to seize German ships to compensate for Spanish ships thereafter sunk by Germany.

The Cabinet statement read:

"In the course of the recent meetings held at Madrid the government considered the international situation. As a consequence of the submarine campaign more than 20 per cent of our merchant marine has been sunk, more than 100 Spanish sailors have perished, a considerable number of sailors have been wounded, and numbers have been shipwrecked and abandoned. Ships needed exclusively for Spanish use have been torpedoed without the slightest pretext, serious difficulties resulting to navigation.

"Consequently the government has decided to address the Imperial German Government and declare that owing to the reduction of tonnage to its extreme limit, it will be obliged in the case of new sinkings to sub-

stitute therefor German vessels interned in Spanish ports. This measure does not imply the confiscation of the ships under definite title. It would be only a temporary solution until the establishment of peace, when Spanish claims also will be liquidated.

To the notice thus served on Germany the latter government replied with several notes of "reassurance" and finally with a threat to sever relations in case German ships were seized.

On August 31, following the sinking of a Spanish vessel with coal from England to Spain, Premier Dato announced the government's decision to put their threat into effect and seize one of the interned German steamers.

NEGOTIATIONS WITH UNITED STATES FOR LOAN.—It is reported that negotiations with the United States for a loan to Spain of from $60,000,000 to $100,000,000 are proceeding satisfactorily.

SWEDEN

COMMERCIAL TREATY WITH ENTENTE.—New York, August 22.—Terms of the commercial treaty recently signed by the Entente Allies and Sweden, which is expected to diminish the sending of supplies to Germany, were made public here today by Axel R. Nordvall, head of the special commission of the Swedish Government to the United States. It gives to the Allies 400,000 tons of deadweight shipping and 2,000,000 tons of Swedish iron ore.

Sweden also agrees to license the export to the Allied governments of wood pulp, paper, iron, steel, etc., and to grant to the Allies suitable credit in Sweden for the purchase of Swedish goods during the continuance of the present unfavorable monetary exchange.

The Stockholm Government, according to Mr. Nordvall, has given satisfactory guarantees that no goods imported to Sweden from allied countries or any nations whose shipping the Allies control will be exported to any of the Central Powers.

In exchange for these commodities, facilities, and guarantees, the Allies have agreed to ship to Sweden bread cereals, coal and coke, mineral and edible oils, sugar, rubber and rubber goods, cotton and cotton goods, hides, leather and tanning material, coffee, cocoa, tobacco, copper, ferro-alloys, tin, tin plate, nitrate of soda, raw phosphates, sulphur "and other goods and materials necessary for Sweden's economic life."

Signing of the pact between the Allies and Sweden, Mr. Nordvall admitted, was a virtual acceptance by the latter government of the Allied blockade. Negotiations, he said, had been carried on by representatives of the signatories since May, 1917, soon after the United States entered the war, and continued for a year. The treaty was signed by France, England and the United States May 29 last.

Conditions in Sweden, the envoy stated, were very serious; in fact, no foodstuffs of any nature were being shipped out of the country because of domestic scarcity. Prior to the depletion of Sweden's storehouse, he said, Germany had been her bigger customer. For twenty-five years Germany had purchased virtually the entire output of the Swedish iron ore mines. Germany would still continue to receive some iron ore from his country, Mr. Nordvall stated, but in greatly lessened quantity.—*Philadelphia Inquirer*, 23/8.

CHINA

HSU SHIH CHANG ELECTED PRESIDENT.—Peking, September 6.—Hsu Shih Chang, former Vice-President of the Privy Council, has been elected President of the Chinese Republic by a large majority.

Hsu Shih Chang became prominent during the latter days of the Chinese monarchy. He was one of the leading statesmen who conducted the negotiations preliminary to the settlement of the relations between Japan, Russia and China as the result of the Russo-Japanese war.

When the Constitutional Government was established Hsu became Vice Prime Minister, and at one time was thought to be in line for the post of Premier. In June, 1917, he was named dictator by a rebel conference at Tien-Tsin. When Huan Tung relinquished the rôle of Emperor in the summer of 1917 Hsu was appointed his guardian. It was later suggested that he might replace President Feng, and last month he was nominated for the Presidency by the Generals of the Northern Chinese army.—*N. Y. Times*, 7/9.

REVIEW OF BOOKS
ON
SUBJECTS OF PROFESSIONAL INTEREST

"Practical Tables for Navigators and Aviators." By Captain Armistead Rust, U. S. Navy. (Published by the author.) For sale by John E. Hand and Son Company, Philadelphia, Pa., and Baltimore, Md.

These tables are contained in a book of one hundred-odd pages, and together with the accompanying diagrams and a Nautical Almanac contain all the necessary data for working almost any type of navigational problem. "They have been prepared with a view to giving navigators and aviators some new methods of finding longitude, azimuth and latitude quickly and accurately, and for solving other important problems in navigation with the least number of figures. The methods used are founded mainly upon original formulas deduced by the author."

The author has clearly and succinctly explained the use of the tables and the method of finding Latitude, Longitude and Lines of Position both by the Sumner Method and by Marcq St. Hilaire. There are numerous problems for practice.

The method for finding Longitude is similar to the method expounded by Martelli in "Time at Ship," and involves looking up only three logarithms, only one of which requires any interpolation.

The Azimuth is obtained by means of Rusts's Azimuth Diagram, a copy of which is appended to the book. The multiplicity of curves and lines in this diagram makes it a little difficult to use and the precision is not that obtained by interpolating in the Azimuth Tables; however, the Azimuth is obtained as close as it can be laid down on a chart.

Latitude by Reduction to the Meridian is obtained by a method devised by the author which was demonstrated in the PROCEEDINGS of Naval Institute, Whole Number 151, May–June, 1914. It is known as "the reduction to the meridian by mean azimuth method." In using this method you are not limited in the hour angle and it may be accurately used beyond the limits of the standard method.

There are also methods for finding Great Circle Courses and Distance, and a new method for identifying unknown stars.

The tables are four-place tables and are so arranged that they occupy a limited space, yet at the same time are so convenient that they may be easily used. As there was some doubt in my mind whether there would be the necessary precision obtained by the use of the tables, a number of problems were worked for Longitude and results were compared with those obtained by using Bowditch Tables. In several cases the results were exactly the same, and in no case did they differ more than 2′ of arc. There was not a gain in speed in working problems, which may be accounted for partly by my greater familiarity with Bowditch Tables.

So many books have recently been written on Navigation by persons who are not familiar with the requirements of the U. S. Navy that one by an expert and experienced navigator (as is the Service reputation of Captain Rust), is worthy of highest consideration. A. W. B.

"Military Signal Corps Manual." By J. A. White. (Published by Wireless Press, New York.)

This manual, as intended by the author, covers a wide range of subjects, all of interest to men preparing to join the Signal Corps, and all of great benefit to those already in who are preparing themselves for advancement.

Parts I and II cover the organization and duties of the Signal Corps, Drill Instructions, School of the Squad, mounted and dismounted, and many other subjects which pertain not only to the Signal Corps but to other branches of the Army.

Parts III, IV and V cover technical subjects. Theories and mathematical deductions are purposely made brief. The book is not intended for the research student. Included is a full description with instructions for care and operation of almost every piece of apparatus in use by the Signal Corps. This covers flag, telephone, telegraph, radio, heliograph and Ardois signals.

The manual is of limited use to the naval service, due to the fact that the writer does not cover the many and varied uses of the Vacuum Tube in radio work. P. L. H.

"Vacuum Tubes in Wireless Communication." By Elmer E. Bucher. (Published by Wireless Press.)

This manual will be found to be of greatest help to commercial operators, experimenters and naval radio men. It gives the results of numerous experiments by the author in the use of vacuum tubes in radio telegraphy and telephony.

The uses of the vacuum tube are varied, and for each purpose there are numerous hook-ups that will serve, some very well, others better. This volume puts before the operator, in concise form, the advantages and disadvantages of the various hook-ups that have been tried out in the detection and amplification of radio signals and the production of high frequency currents.

Vacuum tubes afford a fertile field for experimenters, and this manual gives a number of starting points and serves as a guide for further research. P. L. H.

"Dent's Medical Dictionary." By W. B. Drummond, M. B., C. M., F. R. C. P. (E. P. Dutton and Co.)

Although the laity shy at the title, "Dent's Medical Dictionary," by W. B. Drummond, it was written to help them, and contains a large amount of information and will be very useful as a ready reference in the absence of medical men, for doctors are going to become scarce and scarcer, the scarcity depending, formerly, upon the high standards and requirements

of medical education, and now upon the calls of the war, so all of us may have to become our own doctors, and it is well to know what is best for us even before reaching the age of forty years, the time set for attaining medical wisdom. The object of this dictionary is to put in the reach of everyone a little accurate knowledge which, being accurate, will not be dangerous to anyone. From its articles one will get a good working knowledge of the Laws of Health, as well as the principles of caring for and treating diseases. A good idea may be gotten of the hygiene of infancy and childhood and the diseases which go with the same, very good plates being given to show the difference between the exanthematous fevers, the eruptions of which are so often confusing. Expanded articles are written to instruct as the human cycle expands, and so we learn of exercises and athletics, sanitation and eugenics. The articles on Insects and Disease, Serum Therapy, Insanity, Poisons, Dosage of Medicines, Bandaging and First Aid, and many others, add to general information and help us to discriminate between what is good for us and what is bad for us, so we can avoid some of the red lights or danger signals along the way and will be informed on subjects which so intimately concern us.

The definitions are concise and will satisfy enquiring minds when meeting professional or medical terms not generally understood.

A. M. D. M.

"Brown's Completed Burdwood Azimuth Tables." Price 7/6 net. (Published by James Brown and Son, Glasgow.)

This book is an Azimuth Table for declinations from 0° to 23° between parallels of Latitude 30° to 60° inclusive, from the Horizon to the Meridian. It is similar to H. O. Publication, No. 71 (Red Azimuth Tables), except the Azimuth is tabulated for every four minutes of time, so it is slightly easier to interpolate by inspection. The Red Azimuth Tables are more complete as the Latitude extends from 0° to 61°. A. W. B.

"The Principles of War." By General Ferdinand Foch. Translated by J. de Morinni, late Major, Canadian Expeditionary Forces. With 9 maps. 372 pages. $2.50 net. (New York: H. K. Fly Company, 1918.)

"In the battle of maneuvers the reserve is a sledge-hammer planned and carefully preserved to execute the only action from which any decisive result is expected—the final attack. The reserve is meanwhile husbanded with the utmost caution, in order that the tool may be as strong, the blow as violent, as possible.

"Finally it is thrust into the struggle boldly, with a firm determination to carry a chosen point. Employed for that purpose as a mass, in an action surpassing in energy and violence all other stages of the battle, it has but one objective." (p. 326.)

"There is no longer any strategy to be compared with the strategy which aims at tactical results, at victory by battle." (p. 43.)

And again: "Modern war, in order to reach its purpose, to impose one's will on the enemy, knows of but one means—the destruction of the opponent's organized forces." (p. 311.)

Readers may find in these quotations from the work under review an interpretation of present Allied strategy and a clue to the Allied strategy in the future. Though the lectures on which the book is based were delivered at the French War College apparently at least 15 years ago, we are told, no doubt truly, that "General Foch from his first brilliant work at the Battle of the Marne until now has consistently lived up to every principle here laid down."

From cover to cover the book is an argument against the so-called "battle-in-line," the old-fashioned, conventional, fencing tactics; and in favor of the "battle of maneuvers," in which troops are skilfully economized in order to be thrown into combat in overwhelming strength at the proper place and time. Regarding the force required to inflict such a defeat, the author quotes an interesting conversation between Napoleon and Moreau:

"'You are right,' said Napoleon, 'it is always the greater number who defeat the smaller.'

"'But General, with small armies you have often defeated big ones.'

"'Even then,' replied Napoleon, 'it was always the smaller number who were defeated by the greater. When with smaller forces I was in the presence of a great army, I rapidly grouped my own and fell like lightning on one of the wings which I destroyed. I then took advantage of the disorder which such a maneuver always caused in the enemy's ranks to attack him at another point, always with all my forces. I defeated him thus piece-meal, and the resulting victory was always, as you see, a triumph of the greater number over the smaller.'"

It is the principle of concentration, old but immutable.

The quotations already given may suggest the general trend of the book. But it is doubtful whether other than close students of military strategy and tactics will profit by giving it detailed reading. In the first place, the translation is often obscure through too literal or careless rendering of the French. In the second place, the lectures from which it is taken consist largely of technical studies of engagements and campaigns from the Napoleonic Wars and the War of 1870-71. These could be elucidated by the lecturer with pointer and large-scale maps; but when written out, they plunge the reader into a mass of intricate tactical movements, geographical names, enumeration of forces, etc., which few will have the patience to master.

The first chapter, on "The Teaching of War," lays down the axioms that the more an army lacks war experience the more it needs to study the history of the war; and that having taken the essential step of *determining his objective,* the successful general will be able to turn acquired knowledge to the solution of the problem at hand. The second chapter is on "Modern Warfare," more national than in the past, requiring more thorough preparation, greater mass, greater emphasis on the human element, and more highly trained leadership. These are followed by more strictly technical discussions of "Economy of Forces," "Intellectual Discipline," "Protection," "The Advance Guard," "The Advance Guard at Nachod," "Strategic Surprise," "Strategic Safety," "The Battle: Decisive Attack," "The Battle: Historical Example," and finally, "Modern Battle."

At this apparent giving away of guiding principles, the first naive inquiry will be, "Why, with all our elaborate machinery of secrecy, should not this, of all documents, be kept in the holy of holies?" In answer to which, one may refer to Edgar Allen Poe's disquisition on the game of "guess" or "odd and even," in *The Purloined Letter;* or one may quote Prince Hamlet,

> "But I will delve one yard below their mines,
> "And blow them to the moon."

This book itself shows us, if we had no other evidence, that the Commander-in-Chief of the Allied armies is a thorough student and master of the art of war. Events have shown, however, that he is no blind devotee of theory, no pedant or doctrinaire. It has been pointed out that in the German offensive from the Chemin des Dames, Foch was expected to retreat. It was so written in his book. Instead he deployed to the right and the left, and counter-attacked. The Crown Prince came back to the Marne, to the Vesle, to the Aisne. It may be safely assumed that when General Foch wrote his *Principles of War* he did not pump his well of knowledge dry.

A. W.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-fifth year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be two dollars and fifty cents, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.00; enlisted men, U. S. Navy, $2.50. Single copies, by purchase, 30 cents; issues preceding January, 1918, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1919

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best essay on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the essay.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All essays published in the PROCEEDINGS during 1918, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1919, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No essay received after November 1 will be available for publication in 1918. Essays received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best essay published during 1918 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. Essays are limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

6. It is requested that all essays be submitted typewritten and in duplicate; essays submitted written in longhand and in single copy will, however, receive equal consideration.

7. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

G. M. RAVENSCROFT,
Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ESSAYS

SUGGESTED BY REQUEST OF THE BOARD OF CONTROL

"Duties and Responsibilities of Subordinates with Special Reference to the Relations between Commanders-in-Chief and Chief of Naval Operations; Commanders-in-Chief and Force Commanders; Force Commanders and Division Commanders."

"Initiative of the Subordinate—Its True Meaning."

"Military Efficiency Dependent upon National Discipline."

"Governmental Organization for War."

"Naval Gunnery, Now and of the Future."

"Naval Policies."

"The Place of the Naval Officer in International Affairs."

"Moral Preparedness."

"Tact in Relation to Discipline."

"The Principles of Naval Administration in Support of War-Time Operations."

"What Steps in Organization and Training Should be Taken to Maintain and Increase the Efficiency of the Navy at the Close of the Present War."

"Responsibilities and Duties of Naval and Military Officers of the United States in Educating and Informing the Public on Professional Matters."

"A Commission in The Navy: Its Meaning and the Obligations Which It Involves."

"The Relations of an Officer to his Subordinate, Both Commissioned and Enlisted."

"The True Meaning of the Expression 'An Officer and a Gentleman.'"

"The Effect of the Present War upon Views Previously Held of Naval Strategy, Tactics and Logistics."

"Seen in the Light of Recent Events, What Should Be the United States Navy of the Future as Regards Types and Numbers of Ships."

"Probable Future Development of Surface-craft, Air-craft and Submarines and the Relation of these Types to Each Other and to Naval Warfare in General."

"The Grand Strategy of the Great War, with Especial Reference to Coördination, and Lack of Coördination, Between Naval and Military Forces."

"The Problem of Overseas Operations in the Light of Recent Developments."

"The Influence of Sea Power upon History as Illustrated by the Great War."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize, Essay 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906 By Pay Inspector J. A. Mudd. U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

1916

The Moral Factor in War. Prize Essay, 1916. By Lieutenant (J. G.) H. H. Frost, U. S. N.

NAVAL PERSONNEL. First Honorable Mention, 1916. By Lieut. Commander J. K. Taussig, U. S. N.

EDUCATION AT THE U. S. NAVAL ACADEMY. Second Honorable Mention, 1916. By Lieutenant Ridgely Hunt, U. S. N.

SOME UNDERLYING PRINCIPLES OF MORALE. Third Honorable Mention, 1916. By Commander Dudley W. Knox, U. S. N.

LARGE *vs.* A GREATER NUMBER OF SMALLER BATTLESHIPS. Lippincott Prize Essay. By Lieut. Commander Thomas Lee Johnson, U. S. N.

1917

Commerce Destroying in War. Prize Essay, 1917. By Commander Lyman A. Cotten, U. S. Navy.

THE PEOPLE'S RÔLE IN WAR. First Honorable Mention, 1917. By Lieutenant H. H. Frost, U. S. Navy.

THE NATION'S GREATEST NEED. Second Honorable Mention, 1917. By Colonel Dion Williams, U. S. Marine Corps.

1918

Letters on Naval Tactics. Prize Essay, 1918. By Lieutenant H. H. Frost, U. S. N.

THE PREPAREDNESS OF THE FUTURE. First Honorable mention, 1918. By Commander H. O. Rittenhouse, U. S. N. Retired.

NAVAL STRATEGY. Second Honorable Mention, 1918. By Rear Admiral Bradley A. Fiske, U. S. N.

NOTICE TO MEMBERS

NOTICE TO MEMBERS

More members, both regular and associate, are much desired. Any increase in membership invariably means larger number of papers and essays submitted, and consequently an improvement in the PROCEEDINGS.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join.

By direction of the Board of Control,

G. M. RAVENSCROFT,
Secretary-Treasurer.

CONSTITUTION, Art. VII, Sec. 8.—"The annual dues for regular and associate members shall be two dollars and fifty cents, payable upon joining the Institute and upon the FIRST DAY OF EACH SUCCEEDING JANUARY. The fee for life membership shall be forty dollars." There is no initiation fee.

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.....*191*

To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a { *regular* / *associate* } *member of the U. S. Naval Institute from this date.*

Very truly yours,

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